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2 October 1984

# West Europe Report

## SCIENCE AND TECHNOLOGY

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# WEST EUROPE REPORT

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## BRIEFS

**FRENCH-JAPANESE CERAMICS EXCHANGE**--The French manufacturers are not satisfied with bragging about their talents in Japan. They are also on the lookout for Japanese technologies. Pechiney is carrying out talks with Kyocera, producer of industrial ceramics, and world leader in ceramics for electronics. Mr Inamori, Kyocera president, wants to strengthen his position in Europe. But the grounds for agreement are not necessarily obvious. "What Pechiney is interested in," says Georges Besse, president of the nationalized company, "is a general license agreement, to bolster the ceramics line in our new materials strategy." Kyocera's revenues during the fiscal year ending on 31 March 1984 were 250 billion yen (9 billion francs). Its profits (30 billion yen) are 42 percent higher than those of last year. [Text] [Paris LES ECHOS in French 9 Jul 84 p 6] 11,023

CSO: 3698/604

## AUTOMATED BODY PRODUCTION AT AUDI PLANT DESCRIBED

Wuerzburg AUTOMOBIL-INDUSTRIE in German Jun 84 pp 221-225

[Article by Horst Bleckert, Karl Knoeferle and Edgar Miller: "Integrated Control System for Body Production for the New Audi 100"]

[Text] In automobile manufacture, the production of raw body shells is today the most automated area of manufacturing, besides making parts. Highly efficient automation systems are a prerequisite, with components such as welding robots, control systems and diagnostic equipment. They make it possible for the floor pan assembly, the lower body and finally the body shell to be built in stages from the individual pressed parts. All the individual assemblies and total material flow are controlled and monitored automatically by a complex computer assisted automation system. At the Audi-NSU-Auto Union factory in Ingolstadt a welding transfer line was built for the production of the new Audi 100, which makes it possible to produce unfinished bodies in different versions automatically.

### Manufacturing Design

Today, the variety of models and market influences in the automobile sector require flexible adapatation in manufacturing, which can not only process different versions of one model but also several lines wherever possible. Crucial changes have taken place particularly in the areas of the substructure and the outer body. The picture here is being determined here particularly by the automatic joining of individual parts as well as by the handling of component assemblies and robotic welding of parts. Machine construction, measurement and control technology have to work together in this area particularly, so that a rigid body shell can be built from the floor pan sheet metal, which is extremely flexible initially, and other pressed parts, a shell which leaves the unfinished body section with tolerances of fractions of a millimeter.

Figure 1 shows a schemetic of this manufacturing line. The main line is subdivided into five manufacturing sections. The roof sections, the side parts, the inner fender wells, etc., are produced on the secondary lines and brought automatically to the main line. There is a total of 60 processing stations in

the main line. To these can be added some supply and reserve stations. A common carrier transports the parts within a manufacturing section. While the parts are still deposited on the shuttle for transportation in the floor pan line and in the lower body area, transportation in the remaining sections is by means of pallets. They are moved by D.C. positioning motors from one station to another with an accuracy of $\pm$ 0.1 mm and are positioned absolutely rigidly during the processing period. There are magazines located between the individual manufacturing sections, which isolate the individual sections and make it possible to carry out interim checks. Figure 2 shows a section from the flexible manufacturing plant in the area of upper body construction.

Automation Design

Within the process of automation, starting with the manufacturing priorities and concluding with the control and monitoring of the machines, extremely diverse tasks present themselves in building the unfinished body which can only be solved optimally with a hierarchically well structured system. Taking machine control, data processing, time criteria, installation, maintenance and a strategy for breakdowns into consideration, the result was a control structure shown in figure 3. This is divided into the manufacturing management level, the control management level and the control level.

The tasks assigned to the manufacturing management level are basically those of administering orders, drawing up plans for the shifts, collecting manufacturing priorities for the individual part areas and material tracking. The control management level assumes the responsibility of informing management with numbers for production units, plant use and break down times in the form of records for each shift and for the week, information on maintenance with requests for replacing worn out parts and providing support for plant control with the help of the screen monitor, and issuing the reporting record.

The assignments for the control level are material tracking in the manufacturing sections, calling up supplementary parts, controlling machine operating sequence, identifying breakdowns, drawing up plant diagnosis and preparing reports and data for the management levels.

The control level is linked with the control management level and the manufacturing managment level through two star-shaped networks. Based on this structure, the manufacturing management level and the control level are largely independent of each other, so that a transition from one type of operation to another can be made simply.

Operations Management

In order to increase plant availability an R30 dual computer is installed at the manufacturing management level in stand-by operation. Through a direct link to the planning computer, the R30 receives daily packages of production orders and from them it issues an optimal manufacturing sequence for 1 hour at a time. This suggested program can be changed if necessary in a dialog. The sequence determined upon is sent on ahead through a link with the control level to the starting point of body shell construction for supplying floor pan

sheet metal. The computer sets up production lists for the prefabrication of the side sections, the roof sections and inner fender wells, which are manufactured in batches. While the side sections are taken into a buffer storage area until they are called up to the main line, the smaller parts are made available in containers belonging to transportation. These parts are then supplied according to model depending on the manufacturing sequence in the main line. If momentary shortages of material occur, orders that have already been placed can be cancelled. In this event, the manufacturing computer issues blocking notations to the appropriate control, which holds the bodies back in the buffer storage until they are released. For material tracking in the manufacturing computer, the input and output of each parts line is reported back by model.

Central Monitoring and Program Administration

The entire plant is monitored from a control console which houses the control management computer with all the peripherals. All reports on conditions and breakdowns are collected here through the communications network and they are processed for the logbook and the report for the shifts and the week. Using these events, which are arranged according to different criteria, production management and the maintenance personnel has a way of identifying production output and downtimes for all parts lines as well as weak points. Plant control is assisted by a screen monitor which allows the entire plant to be observed using overall and partial images. While the overall images contain collective reports, the breakdown criteria collected at the individual controls, the duration and the number of reports occurring in the current shift are faded into the station pictures. These automatically recorded breaksdowns can be supplemented by manual inputs at terminals, one on each line. At these terminals the maintenance personnel can systematically input additional information about the original cause of the breakdown with an indication of the plant involved. When the record is printed out, the maintenance personnel receives requests to replace worn parts and to perform maintenance work. This includes replacing buffer batteries, carbon brushes and filters.

A central archive is located in the control management computer for the documentation and maintenance of the programs in the SIMITAC 55 controls. For each control up to four implementation states can be stored in memory. The following information must be accomodated in a preload to each control number: control number, program description, status of corrections, date of documentation, last time of loading and the name of the one responsible.

The programs are operated by means of masks. Loading the programs into the data bank can be carried out by means of diskettes or as a copy of the control program over the link. To simplify this procedure, commands are implemented in the interface module which automatically process the input and output of user programs. In this way it is also possible to load the user program anew from the program archive following a memory failure. The initiative is again provided by a mask which is constructed in a similar fashion to the documentation mask. In this way maintenance personnel have a convenient documentation and storage system available, with which all the controls can be operated in a short time without additional assistance in the event of breakdowns.

This arrangement is supplemented by the PG 690 program set up and documentation system, with which control programs can be newly set up, changed or altered programs can be retranslated at the control and newly documented by means of a rapid printer.

Control Level

Within the prescribed framework special importance attaches to the control level with respect to the scope and real-time processing of all the signals from the peripherals. In order to maintain manufacture, great availability is the prime requirement, if necessary without the other levels of the hierarchic systems functioning. Taking other points of view into consideration, the powerful memory-programmable SIMATIC S5, with decentralized structure, was selected on the control level. In principle, each processing station is given a separate control. This resulted in overseeable units, short startup times as a result of the possibility of parallel work and short wiring paths.

At the control level an additional sequence of command tasks was assigned to the conveyor system. Among them are, for example, the release for the station controls and model tracking within a manufacturing section.

Taking into consideration the tasks which have to be carried out at the control level, AG-S5-150 automation equipment was selected. These pieces of equipment offer adequate memory capacity for the user program, make structured programming possible as well as standard hardware and software modules for sequence controls, for the operation of data viewing equipment and for the computer link.

The programs for all the controls are set up in accordance with a uniform software design. Within this framework, the program modules for checks, types of operation and starting the line are all identical. Two interfacing levels are available to control the machine sequence: the sequences level to emulate the machine sequence and the output level with safety locks, which are also effective when manually operated.

Material Tracking

The mechanical plant is arranged in such a way that the mixed manufacture of all model versions is possible. A further consideration was that, after the individual manufacturing sections, the parts run into interim buffer storage, where the sequence does not have to be preserved. So each floor pan carries its model code on a metal tag in which the information has been punched in in the form of holes.

The model code is read at the first station of a manufacturing section. With-Within this area, the model information is carried along with the production cycle in the conveyor system and is transmitted before the release is given for the work cycle to all the work stations, which branch into the appropriate work programs on the basis of this control information and key the model indicator, which is fixed by station, in the manual control desk.

Supplied parts, like roof sections, which have a long access, are called up by the conveyor system, but are decoupled by the delivery cycle of the main line. In addition, a buffer storage register is designed into the acceptance controls, in which input and output are independent of each other. The size of the register is determined by the preliminary time required for the conveyor system, while the sequence is established by the linear run of the information through the register points. The contents of the register can be checked by means of the diagnostic equipment and altered if necessary.

Diagnostic System

The completed diagnostic systems and programs enable the operator of this welding transfer line to limit downtimes resulting from malfunctions to a minimum. Installations of this kind are becoming increasingly important as automation proceeds.

Malfunctions in these plants can be divided into two categories, internal and external malfunctions. The automation equipment already contains the appropriate installations to recognize internal malfunctions, errors in the equipment. They include programs to monitor current, component groups and cycle time.

External malfunctions are mainly errors in senders and drives as well as breakdowns in the mechanical sequence of movement. Experience shows that external errors make up 99 percent of all malfunctions. It was obvious that measures should be provided to make the search for errors easier when external mistakes occurred.

When determining the design of the diagnostics, which is user-friendly and relieves the programmer of additional work in setting up the control programs, the maintenance organization and system management were also taken into consideration. This led to a design which provides central and local displays for system management and detection of errors.

While specific system conditions are detected with the viewing screen for central monitoring of the plant, DG 650 diagnostic equipment is built into the individual stations, which automatically display the part of the program affected on a screen when there is a breakdown in the process. In addition, the equipment contains the main programming equipment functions.

In diagnostic operation the system functions as data viewing equipment with central initiative, with common use of the programming equipment software for status display. In the controls an agreed upon communications area is used, in which the assignments for the diagnostic equipment are deposited and which is periodically interrogated by the diagnostic equipment. Through the appropriate codeword in the communications area it is determined whether a text or a program module is to be displayed.

Figure 4 shows the software structure for automatic display of an interruption in the program. As was described in the control structure, the machine's movement flow is shown as a flow chain through the step modules SB1 through

SBn in conjunction with the function module KETORG [acronym not identified] and monitored in time. In the event of a malfunction the diagnosis is prompted by this time monitoring TUE [Time Utilization Efficiency]. The function module KETUEBWA [acronym not identified] transmits the step number and the attendant output modules to the communications area of the diagnostic equipment and initiates the display of the non-completed step on the screen in contact plan symbolic language. The status of the individual parameters is continously brought up to date, as in the STATUS operating mode of the programming equipment. The double line or the broken line indicates whether the condition is fulfilled or is not fulfilled. The non-fulfilled step forward conditions can be read off directly. For further investigation of the output plane, the display can be switched to display the output modules by acknowledgement at the diagnostic equipment. In this case, the output module or modules appear, that are keyed by step n-1. Figure 5 shows the status report of a step module with the missing report "Spann. zu." Below it can be seen the output module which is keyed by cycle 2 and appears following acknowledgement of the step module.

So that the maintenance personnel are not forced to operate only with the machine's parameters, for example, for inputs and outputs, the equipment also an additional EPROM [Erasable and Programmable Read Only Memory] memory, with 32 K bytes for plant symbols. It accepts the plant notations for 1,000 inputs, 1,000 outputs and 2,000 markers, each with 8 alphanumeric signs. The switch from absolute parameters to plant designations can be made by key punching at the equipment.

9581
CSO: 3698/581

## BRIEFS

FIAT RESULTS UP FOR 1983--Turin, 23 July (AFP)--A spokesman of the Italian group Fiat announced Monday in Turin that the net consolidated profit of the company for 1983 reached 253 billion liras (about 1.2 billion French francs), compared to 137 billion in 1982. The revenues of the group, which includes 410 subsidiaries and 134 participations distributed among 52 countries, amounted to 21,985.4 billion liras, a 7 percent growth over 1982. This growth is primarily due to results in the automobile sector (+14 percent), agricultural tractors (+10 percent), components (+11 percent), and bioengineering (+40 percent). At the same time, the revenues of the industrial vehicle and public works sectors are lower by 9 percent and 17 percent respectively. Fiat's self-financing increased by more than 28 percent, from 1145 billion liras in 1982, to 1468 billion in 1983. The group's net debt, at 5401 billion liras, is 768 billion lower than in 1982. Net total assets (except minority interests) amounted to 5106 billion liras at the end of 1983, against 4903 billion one year earlier. In 1983, the group obtained 73.1 percent of its revenues in Italy, compared to 71 percent the previous year; 206,500 of its 243,800 employees work on the peninsula; and 16.5 percent of the revenues were obtained in European Community countries, mainly in France and FRG. Compared to 1982, operating costs have increased by about 7 percent overall, notably due to an increased depreciation of more than 200 billion liras, and to a growth of about 60 billion liras in research and development expenses. Among the costs not associated with operations, is a drop in financial expenses from 3.6 percent of revenues in 1982, to 3.1 percent in 1983. [Text] [Paris AFP-AUTO in French 24 Jul 84 AFP 231538 JUL 84] 11,023

CSO: 3698/606

## FRENCH VENTURE CAPITAL ATTRACTED TO BIOTECH

Paris BIOFUTUR in French Jul 84 pp 15-24

[Text] Technological innovation fascinates investors: witness the prodigious success of American venture capital.[1] In France, the multiplication of "SFIs" (Societies Financieres Innovation) and organizations with comparable goals illustrates the readiness of financiers. But the SFIs cannot unload their funds because of the absence of solid business plans.

A financier who invests in new technology is well aware of the risks and the long payback period. For this reason, he demands that the industrial project come to him with a credible proposal, has a reasonable chance of being profitable, and be run by a competent management team. Between 1972 and 1982, SFIs invested in over 150 new-technology companies.[2] So it would be incorrect to say that France has no high-quality projects. But we must remember that American venture capital funded the development of over 3000 companies of this type. Moreover, the payoff in France is far inferior to that in America. Mr Tchenio of APA Capital-Risque gave at the AFINOVAC Symposium[3] the five reasons that convince him that the "lean" period of French venture capital is over: a market highly favorable to innovation, a new generation of executives ready to take on the risks of setting up new companies, the availability of investors, government willingness to help small business and new technology, and creation of the "second stock market" (see Table 3 below).

### What Industrial Structures are Needed for Developing Biotech Innovation?

Transgene (genetic engineering), Immunotech (immonology), Germe (macromolecules), Biosys (diagnoses and reagents), and CIRTA (chemistry and biochemistry of natural products) showed that it is possible to create high-level biotech companies in France.

Here we should point out that in genetic engineering, a strong lead has been taken by Genentech, Genex, Cetus in the USA, Biogen, Celltech, and Transgene in Europe. A startup like that of Genentech (several hundred million dollars) is no longer possible, and many specialists reckon that it costs 100 million francs to break into this field.

For this reason, most financiers, even in the United States, are no longer willing to "finance laboratory manipulations." The creation from ground zero of biotech firms is no longer viable unless they can get into the industrial phase (selling products) within 2 years. But this sector has not yet achieved the industrial maturity electronics enjoyed in 1975. Moreover, some of the most promising markets (pharmacy and veterinary medicine) are handicapped by drawn-out government monitoring procedures. P. Palasi of the Compagnie Financiere noted that, in the United States, a financing structure more suited to these problems, the R and D limited partnership, is beginning to be replaced by venture capital in the biotech field.[4]

In the immediate future, without excluding the creation of entirely new companies, it is preferable to consider other methods whereby the risk now inherent in biotechnologies would be offset by industrial expertise and an industrial base.

First of all, it is possible to contribute capital to support a small- or medium-sized business whose activities are connected with biotech (pharmaceuticals, agribusiness, seed selection, engineering, etc.) The second technique, a very attractive one, is called "essaimage" (literally: "swarming"). J. Lewintre of BRED defines this as a joint venture between an industrial group which generally supplies the industrial or marketing structure, the financier, and an upper-level management team from a division in the group. This is not the creation of an ordinary subsidiary (such as Air Liquide's spawning of Eurozyme) nor an entirely new start by people who met each other at work. Here, the creation of Immunotech is interesting. Although the idea was launched by INSERM, with which a cooperation agreement was subsequently signed, it was the management of this firm which organized its setup.[5]

"Essaimage" assumes an open-mindedness rarely found in industrial management.[6] But it is useful to rely on existing teams that are technologically consistent and use to dealing with the difficulties of the industrial world. P. Devictor of Sofinnova believes that, if one must set up a company, best talk to industrial groups where the teams already exist.

People and a Plan

Although everyone recognizes the need for a team and a leader, opinions differ as the relative importance of the two. Whatever the case may be, it is essential that they be competent in technology, in marketing, and in finance. Even this is not enough: there are no freebies in business life. So the human qualities needed to manage everyday difficulties are needed. Y. Roucaud of Idianova makes no secret of the fact that, from the very first meeting, he tests the project promoters' capacity to withstand discouragement.

It is to men and women that the financiers entrust their money and not to a product or an innovation. So, the first thing they do is to make sure of the credibility of these people, whether they are first-time entrepreneurs or directors of growing businesses. Natio Innovation even defines its activities as accompanying a "hard core" of majority stockholders responsible for management. Product, market, and the financial prospects they offer come in second

place. They must be described in a business plan (see Table 2) whose degree of sophistication matches the custom in each organization. Thus, J. Stouff of Soginnove merely expects the materials requested by other funding or loan organizations to be sent to him, and insists mainly on the consistency of the development strategy.

The proposed product must be truly an innovation, i.e. it must guarantee an "added value" for the project based on the process economics, or the meeting of known customer needs. The potential market must be sufficiently large to provide substantial growth prospects. The market study must show how solid the project is, but the best way of ensuring its credibility is to provide concrete evidence of customer interest (commitments to purchase, description of needs, etc.).

Mr Richou of CIC notes that in the cases of small businesses already far on the road to development, the rigor and solidity of the business plan are all the more important in that it must show that the development project will not financially stifle traditional activities.

The Meeting

An initial telephone contact will establish whether the project matches the goals of the organization. Then a letter of intent about 15 pages long can state the method of cooperation considered. P. Devictor says he undertakes to let the caller know promptly if the answer is "no." Indeed, a refusal by one organization does not necessarily mean that a project is not valid. Contrary to the case with American venture capital, the French rarely commit money to the feasibility study phase of the project. It is said that this is what ANVAR is for, and that the ability to get grants is the first proof that the project originators are credible. But C. Civiale of Inovelf has already financed "precreation." Also, E. Delattre of Paribas and J. Stouff believe that, in the particular case of biotechnologies, this investment will probably be necessary provided of course the process is technologically viable in the pilot stage, or at the laboratory level in certain cases. There is also the case of Epicea where feasibility studies are already well under way since this SFI has the goal of bringing Atomic Energy Commission patents to commercial fruition.

Most organizations believe that implementing the business plan is part of their function. B. de Valroger of Agrinova actually provides a form containing the information he wants. This attitude is consistent with the purpose of the organization, which plays a major part in creation of new businesses. But forms are also sent out by other financiers such as Natio-Innovation.

Venture Capitalists and Their Affiliates

Once the agreement is made, each of the organizations sets up the operation financially. As leaders, they will provide between 10 percent and 30 percent of the investment. In addition, they will contact their colleagues and complete financing needs by calling for participative loans from specialized companies. In the United States, the financier pool generally owns more than

half the equity in the newly created firms. This situation would be unusual on the French scene where venture capitalists rarely sit on the Board of Directors. They note that important decisions are not taken by the Board and that it prefers to use persuasion with the company managers. Finally, they look with great caution at a practice very common in America: replacement of the original project team by more competent managers. But in many cases they do convince their affiliates of the need to complete the management team in areas where it is least efficient.

Some progress in the mentality of the entrepreneurs can be noted, however: J. Stouff points to the case of one of his affiliates whose originators agreed to hand management over to a stockholder industrialist once they saw that their own efforts had failed. After a difficult startup, the originators recognized that it was preferable to admit to being minority shareholders and that, especially in biotechnology, a new company must have industrial partners from the very start (in this case, Sanofi, Institute Pasteur through the intermediary of Inovelf). Likewise, Germe was able to benefit, in the medium term, from the involvement of Pernod-Ricard in its capital.[7]

As a rule, venture capitalists devote between 1 day a month and 3 days a year to their affiliates. They contribute their experience of regularly monitoring comparable companies but also more immediate services linked to their participation in a larger formal or informal group: assistance in penetrating foreign markets, additional finanical packages, and, in the cases of Epicea and Inovelf, providing an industrial and research base.

Finally, there is the stock option system from which the managers of Transgene and Immunotech, among others, have benefited. In the latter case, Sofinova guaranteed to give them stock free of charge after 3 years if the jointly established goals had been met.

Biotechnology Sectors in Which Venture Capital is Interested

In the view of APA Capital-Risque, the firms must be able to sell something from the very beginning, but also have remunerative contracts (research financing, joint ventures) and be supported by industrial or public investors who specialize in their own sector. Projects which seem to guarantee a large market and quick sales, according to this company, are biological organisms (B. subtilis, cell culture), protein chemistry, and biological tissues. But it will be noted that APA has already invested in genetic engineering, microbiology, monoclonal antibodies, biochemical "instruments" (enzymes and reagents). The objective of Mr Tchenio, the head of APA Capital-Risque, is to contribute to individual successes comparable to those obtained by the founders of Apple, of which APA was one of the financiers. This implies that its affiliates be able to think big and look far ahead, with the goal of spectacular financial successes. But the points Geynet of Natio-Innovation believes important are not very different from those just described. Here we find diagnostics, instruments for biological and medical analysis, but he also cites processes interested in health, plant health, and food agriculture businesses. He adds that the firm must eventually become an international company which, when one

comes down to it, means that it must be capable of imposing its products on the American market. This is why a number of organizations insist on coordinating their activities with their branches in the United States (Sofinnova, Agrinova, Inovelf) or in the United States and Great Britain (APA) or the United States and Japan (Interven, Soginnove).

Although J. Stouff emphasizes ferments, macromolecules, or monoclonal antibodies, he notes that the more prosaic applications of biochemistry, such as reducing the time it takes sauerkraut to ferment (Christ) or methane fermentation (Valorga) can also be profitable. Agrinova and Idianova deal in a narrow range of branches. Agrinova is interested in business plans in the food and agriculture business, including farming techniques, and new energies. Idianova is even more specialized: it supports innovative projects in food processing. Epicea's activities are directly linked to the research work of the AEC, so, according to Mr Vuillemey, it can invest in nuclear medicine, biomaterials, separation techniques, and application of ionizing treatments to the food and agriculture industry. Finally Inovelf, according to its bylaws, is less interested in immediate profit that the gains yielded by its operations for Elf Aquitaine group (including Sanofi) in the energy, chemical, and pharmaceutical sectors.

Most of the experts insist that the biotechnologies be grounded in a proven industrial network. This is why the financing companies which are less oriented to innovation but have the experience of monitoring developed companies can play an important role. The largest and oldest of them, IDI, did in fact contribute to financing Eurozyme (lactic ferments) and Protex (chemistry). In addition, it is one of the large stockholders in several SFIs and plans to step its role in maintaining innovation. We should also cite IDIA and the Union Etudes et Investissements: the latter is known to be a large stockholder in Orsan-Eurolysine. Also, the Paribas group "set up" Transgene and Banexi was associated in the Immunotech operation. Moreover, numerous FCPRs (Joint Venture Capital Investment Funds) will, because of their structure, be in a particularly good position to contribute to the "essaimage" of large groups.

On another plane, the SDRs (Regional Development Companies) and IRPs (Regional Participation Institutes) can facilitate a new company's joining the existing local industrial fabric. While the SDRs monitored "biotechnology" operations launched by the SFIs, the IRPs are not particularly organized for setting up this type of financing. However timid incursions of some of the IRPs into new technical fields are noted.

Financial Innovation Companies (SFIs)
In Order Of Starting Date And Similar Companies

| Name/Address | Capital in 1984 (millions of francs) | Investment Range | Functions/Goals/Services |
|---|---|---|---|
| SOFINNOVA<br>51, rue Saint Georges<br>75009 Paris<br>Tel:(1)280.68.70 | 154<br>(SFI) | 0.3 to 5 | Technological innovation with sectoral specializations. Financing of Valorga, Immunotech, Jouan. U.S. venture capital subsidies (Biogen, Genentech, Collagen, etc.) |
| SOGINNOVE<br>5, rue Boudreau<br>75009 Paris<br>Tel:(1)742.70.60 | 60<br>(SFI) | 0.3 to 2 | Technological innovation in all branches. Financing of Germe, Biosys, Bertin Et Cie, Laboratories Goemar, LEV, Valorga, Sepac. Benefits from infrastructure of Societe Generale, particularly in U.S. and Japan. |
| EPICEA<br>29-33, rue de la Federation<br>75015 Paris<br>Tel:(1)273.60.00 | 20 | 0.3 to 2 | Developing AEC patents and promoting innovations of interest to the AEC. Contributes the industrial and research infrastructure of the AEC. |
| AGRINOVA<br>33, avenue du Maine<br>75755 Paris Cedex 15<br>Tel: (1)323.28.22 | 25<br>(SFI) | 0.2 to 1.5 | Innovations in agricultural, food, wood, paper. Financing of Biosys, Immunotech, France Embryon, Mida-Tra. American venture capital subsidiary. Benefits from infrastructure of Credit Agricole. |
| IDIANOVA<br>35, avenue F.Roosevelt<br>75008 Paris<br>Tel:(1)359.91.41 | 30<br>(SFI) | 0.1 to 1 | Innovation in agricultural and food processes. Financing of Barberet and Blanc laboratories. Action coordinated with IDIA. |
| INNOVEST<br>3, Quai Kleber<br>67055 Strasbourg Cedex<br>Tel:(88)32.98.50 | 11<br>(SFI) | 0.3 to 1 | Innovation all branches in Alsace, Lorraine, and Franche-Comte. Benefits from infrastructure of regional Banques Populaires. |
| SUDINNOVA<br>20, rue de la Bourse<br>69002 Lyon<br>Tel:(7)842.99.63 | 12<br>(SFI) | 0.3 to 1 | Innovation all branches in Auvergne, Bourgogne, Franche-Comte, Languedoc-Roussillon, Provence, Alps, Riviera, Rhone-Alpes. Financing of CIRTA. Benefits from infrastructure of SOFINNOVA, President A. Merieux. |

| Name/Address | Capital in 1984 (millions of francs) | Investment Range | Functions/Goals/Services |
|---|---|---|---|
| NATIO INNOVATION<br>12, rue Chauchat<br>75009 Paris<br>Tel:(1)244.72.90 | 25 to 30<br>(SFI) | 0.3 to 1 | Innovation all branches. Action coordinated with BANEXI (which contributed to financing Immunotech). Benefits from infrastructure of the BNP. |
| APA Capital Risques<br>67, rue Monceau<br>75008 Paris<br>Tel:(1)563.35.13 | 100<br>(FCPR) | 5 total des engagements sur une seule affaire | Apply venture capital techniques in France. Benefits from infrastructure of APA (venture capital in USA; 7 investments in biotech and in Great Britain) |
| INOVELF<br>7, rue Nelaton<br>75015 Paris<br>Tel:(1)571.72.73 | (available)<br>25<br>(SA) | 0.2 to 6 | Innovation in fields concerning ELF-AQUITAINE(chemistry, drugs, etc.) Financier of France-Embryon, Medifrance Industries, SETRIC Biologie, Bionys, associated with Elf Technologies (venture capital in USA). |
| INTERVEN<br>41,avenue de l'Opera<br>75002 Paris<br>Tel:(1)298.07.65 | 42<br>(SA) | 0.3 to 1 | Innovation all branches. Manages venture capital in the USA and Japan. Benefits from infrastructure of PARIBAS which set up Transgene in France and Centocor in the USA. |
| SOPROMEC IDI<br>1,rue du Vieux Colombier<br>75006 Paris<br>Tel:(1)354.34.00 | 104<br>(SA) | less than a 2.5 | Financing of rapidly-growing small businesses with annual sales less than 100 million francs. |
| IDI<br>4, rue Ancelle<br>92200 Nueilly-Sue-Seine<br>Tel:(1)758.14.11 | 1029<br>(SA) | 1 to 25 | Financing of high-performance medium-sized businesses whose growth is restricted by lack of capital. Financier of Eurozyme. Largest French organization in terms of its own equity. Has a subsidiary in the U.S. |
| IDIA<br>23, avenue F.Roosevelt<br>75008 Paris<br>Tel:(1)359.91.41 | 450<br>(SA) | 0.5 to 7 | Financing mediun-sized businesses in agriculture and food.<br>Action coordinated with IDIANOVA. |
| UNION D'ETUDES ET D'INVESTISSEMENTS<br>128-130,bd Raspail<br>75006 Paris<br>Tel:(1)323.21.21 | 800<br>(SA) | 10 to 150 | Invests in large and medium-sized businesses already existing and being set up in food and agriculture (restructuring situation, exports, innovation). Stockholder in ORSAN-EUROLYSINE. |

| Name/Address | Capital in 1984 (millions of francs) | Investment Range | Functions/Goals/Services |
|---|---|---|---|
| BANEXI<br>12,rue Chauchat<br>75009 Paris<br>Tel:(1)224.72.90 | 270<br>(SA) | 1 to 25 | Finances rapidly-developing companies. Benefits from infrastructure of NBP. Action coordinated with NATIO INNOVATION. |
| SOFININDEX<br>51,rue Saint-Georges<br>75009 Paris<br>Tel:(1)280.68.70 | 50<br>(SA) | 1 to 3 | Supports small and medium-sized businesses with capital, setting up subsidiaries abroad or exporters. Benefits from infrastructure of SOFINNOVA. |
| AVEPAR<br>41,Avenue de l'Opera<br>75002 Paris<br>Tel:(1)298.07.65 | 40<br>(SA) | 0.5 to 3 | Finances rapidly-growing small- and medium-sized businesses which have already proved profitability. Benefits from infrastructure of PARIBAS (American and Japanese subsidiaries). |

Table 1. Abbreviations and Their Legal Significance

A. Legal framework common to several organizations.

--SFI (Financial Innovation Company)

Has the objective of "facilitating in France the industrial implementation of technoloigcal research and promoting and operating investions relating to a product, process, or technique, already invented or to be invented, which have not yet been worked, or which offer entirely novel applications." They participate in the creation or development of companies making sales of less than 300 million francs, provided they are not more than 50 percent controlled by companies exceeding this figure (under certain conditions, the limit can be raised to 500 million francs). No stockholder can hold more than 30 percent of the capital and at least 60 percent after 3 years. No investment may represent more than a quarter of the total capital. The SFIs are obliged to retire one-third of their participation every 6 years.

--FCRP (Joint Venture Capital Investment Funds)

"At least 40 percent of the assets in FCPRs must consistently be composed of shares, stock, or convertible bonds in companies whose shares are not officially quoted on the stock exchange or the "second market." When the FCPR is liquidated, the fund manager benefits from up to 20 percent of the liquidated amount.

--SDR (Regional Development Companies)

SDRs were set up to take minority shares in regional small businesses, possibly those in the course of organization. However, granting loans and medium-term collateral is the major part of their activity, except for Sofimac and Sofiparil.

--IRP (Regional Participation Institutes)

The IRPs participate, on a minority basis, only in equity or near-equity.

B. Private organizations

--IDI (Industrial Development Institute)

The government owns 49.95 percent of the shares. The other stockholders are banks and other financial organizations.

--IDIA (Farming and Food Industry Development Institute)

The main stockholders are Credit Agricole, Credit National, and IDI

--SOPROMECIDI (IDI Economic Promotion Company)

The main stockholders are IDI (49.5 percent) and the group of Banques Populaires (35 percent). It also manages the Ile de France DSR (SOFIPARIL).

--AVEPAR

Owned by Paribas and various institutional organizations.

--INTERVEN

Owned by Paribas and various institutional organizations.

--Union d'Etudes et d'Investissements (UI)

100 percent of the Caisse Nationale du Credit Agricole.

--SOFININDEX (Export Industry Financing Company)

Subsidiary of the Banque Francaise du Commerce Exterieur, finanical organizations, and large industrial groups.

--INOVELF

100 percent subsidiary of the Societe Nationale Elf Aquitaine.

--BANEXI

Subsidiary of the BNP.

--Others

Other organizations exist such as the VIF (Vosges), Herikoa (Netherlands), or reconversion companies in the regions suffering most from the crisis (SODELOR, SOLODEV in Lorraine, SOFIREM in the mining areas, etc.). Insurance companies created SOFINDAS, open to all branches of industry. Their activities are similar to those of the SDRs or IDIs, but the smallest of them tend to favor small firms or even "cottage industries."

C. SOFARIS (French Small Business Venture Capital Insurance Company)

SOFARIS is a mixed-economy corporation, 34 percent government-owned. Neither creators of companies nor small-business managers will be able to contact SOFARIS. But it plays an important part in that a growing number of financial organizations benefit from the guarantee it offers their operations in corporate equity or near-equity in favor of small businesses with sales less than 500 million francs.

In principle, it offers a 50 percent guarantee against bankruptcy or liquidation. Its coverage can be increased to 65 percent in the case of businesses being organized or reorganized. For the time being, it supports only operations whose capital is owned or almost owned by SFIs, certain IRPs, and SOFININDEX. But it can also support SDRs and can extend to other specialized organizations, even FCPRs.

Table 2. The Business Plan

A. A Basic Document, a Thorough Piece of Work, A Personal Commitment

A high-quality business plan will obviously be welcomed by financiers. But it must first of all be thought of as a decisionmaking aid to the entrepreneur or future entrepreneur. It will also serve to measure the results of the investment.

The summary document must be clear and relatively short (five pages) but its preparation entails between 6 months and a year of exhaustive research. It will be organized according to the advice of one or more of the organizations most likely to invest. Each organization stresses one or more particular aspects, depending on its own goals. It is preferable, particularly in the creation or startup phase of new companies, for this work to be done by the management team itself, so that this team will get a grasp of all the problems involved.

B. Thorough Knowledge of the Company, Product, and Market So Risks Can be Spotted

Typical business plan formats call for 15 to 20 sections. We will group them here in six chapters. Each of them must be approached from two standpoints: factual findings, and proposals for activities within the framework of the investment proposed.

a) The company and its management team

--If the firm already exists, submit past years' figures, financial structure, position in branch of activity, etc.

--Provide resumes of directors, their competence, particularly with regard to the project, and the resulting organizational hierarchy; specify points in which the team is weak and steps to be taken (recruiting, etc.)

b) The products and their production

--Describe the products, their innovative aspects, and (particularly) the chances of patenting them, and discuss the actual industrial guarantees conferred by the patent.

--Describe the production lines, investments to be made, equipment delivery times and conditions, personnel to be recruited and skill levels, hence cost of products.

c) The market and distribution

--Give the size of the market (France and abroad), its growth rate, specific needs of customers to which the company's products are directed, competitors' strengths and weaknesses, and hence the profit the company may expect.

--Give detailed description of distribution system, number of intermediaries, marketing strength and strategy, and hence possible selling prices.

--More prosaically, provide concrete evidence of customer interest in project (purchase commitments, letters or documents explaining this interest, comparable experience of other firms).

d) Sales and income projection

--For each of the 5 years to come, establish the expected sales for each product, the share of the market they must conquer, and selling prices that could be achieved or must be set.

--On this occasion, make as complete a list as possible of the hypotheses on which the projections are based.

e) Financial projection

--In the case of a developing small business, present a financial projection of existing activities over 5 years, showing how far the company itself is able to provide financing and covering of risks involved in project.

--Present project's financing needs and possible sources (contributions from entrepreneurs, subsidies and other government aids, own funds, loans, etc.)

--Prepare projected balance sheets for the 5 years to come, a monthly projection for the first year and a quarterly projection for the second, with profit and loss.

--Indicate additional financing needs expected in 5 years' time.

f) Detection and measurement of risk

--State frankly the risks of the operation, the impact each risk could have on its success, and measures planned to overcome difficulties.

Table 3. Some Definitions

Equity

Contributions from partners (stockholders) forming the collective guarantee against liquidation of the business. "Near-equity": bonds convertible into stock, partners' accounts, and participative loans.

Small Business

DATAR defines industrial small businesses as those with sales less than 500 million francs. Companies with over 150 million in sales and over 500 employees can be termed "medium-sized."

Second Market

Created in 1983, it enables small businesses at a certain level of development to be quoted on the stock exchange under less severe conditions than those of the official market, but offering superior guarantees to those not quoted. This is equivalent to the over-the-counter market in the USA to which venture capital owes its prodigious success.

R and D Limited Partnership

One might say that the R and D limited partnership brings to biotechnology what venture capital brought to electronics. The investors, who benefit from tax advantages, contribute financially to a specific R&D project and not to the capital of the company. If the project succeeds they receive a percentage of the royalties, considered as a capital gain and hence taxed more favorably than income. If not, the investment will be lost. Three hundred fifty million dollars (2.8 billion francs) have already been invested in biotechnology in the U.S. trhough this channel*.

*According to "New Trends in Financing Biotechnology," T. M. Powledge et al., Bio/Technology, September 1983, pp 546-559.

Financial Organizations for Small and Medium-Sized
Businesses with Strong Growth Rates
And "Essaimage" of Large Groups [list closed 5 March 1984]

| Name | Reference | Area of Activity |
|---|---|---|
| PROMOLION I | Credit Lyonnais | FCPR: companies not quoted on stock exchange |
| PROMOLOIN Rhone-Alpes | Credit Lyonnais | FCPR: regional companies not quoted on stock exchange |
| FORINVEST medium firms | Private financial management bank | FCPR: medium-sized companies, not quoted on stock exchange |
| FORINVEST small and medium companies | Private financial management bank | FCPR: creation of non-quoted small businesses and industries |
| Portefeuille Innovation | CIC | FCPR: medium-sized technology enterprises |
| Portefeuille Jeune Entreprise | CIC | Same as above |
| AUDACES I | BRED | FCPR: developed small businesses |
| AUDACES II | BRED | "essaimages" closely linked to original groups |
| AVENIR INDUSTRIE | Central Fund of Banques Pop. | FCPR: second growing small business financing plus executives taking over small businesses |
| AGRI ENTERPRISES | Credit Agricole | FCPR: all small businesses plus complementarity with AGRINOVA |
| EURO DEVELOPPEMENT | Banque de l'Union Europeene | FCPR: companies not quoted on stock exchange |
| INVESTISSEMENT RISQUES | Cie Financiere de Suez Banque Indosuez | FCPR: new or growing companies not quoted on stock exchange |
| CASTIGLIONE INVESTISSEMENTS | Barclays Bank | FCPR: growing small businesses searching for international partners |
| COFIDIC | Paribas Credit du Nord | FCPR: "essaimage" and taken over by executives with stock options |
| SOFINDAS | All insurance companies | S.A.: accompany other financial organizations |

## The SDRs And IRPs

| Regional City | SDR | IRP (capital in million francs) |
|---|---|---|
| RENNES | SDR de Bretagne | |
| DIJON/BESANCON | CENTREST | IDEB (20) (Dijon) |
| LIMOGES/CLERMONT-FERRAND/ POITIERS | SODECO + SOFIMAC (Clermont-Ferrand) | IDPC (43) (Poitiers) |
| REIMS | CHAMPEX | IRP Champagne-Ardennes (18) |
| BORDEAUX | EXPANSO | AUDITEX (47)<br>HERICOA (4) (Hendaye)* |
| NANCY | LORDEX | ILP (10) (Metz)<br>VIF (1) (Epinal) |
| MARSEILLE/NICE | SDR Méditerranée | IAD (10) (Marseille)*<br>+SAMENAR (Digne)* |
| LYON/GRENOBLE | SDR du Sud-Est | SIPAREX (180) (Lyon) |
| LILLE | SDR Nord et Pas-de-Calais | PARTICIPEX (75) |
| CAEN | SDR de Normandie | |
| AMIENS | SDR de Picardie | |
| STRASBOURG/MULHOUSE | SADE | |
| TOULOUSE | TOFINSO | IRDI (83) |
| NANTES | SODERO | IPO (100) |
| MONTPELLIER | SODLER | SORIDEC (31) |
| CAYENNE | SODERAG | |
| ST DENIS DE LA REUNION | SODERE | |
| NOUMEA/PAPEETE | SODEP | |
| PARIS/ILE DE FRANCE | SOFIPARIL | |

Sources : SDR : ANSDER, SOFIMAC, SOPROMEC-IDI
IRP : SOFARIS

*Organizations not exactly organized as IRPs.

Some Venture Capital Affiliates in France

| ACTIVITY | GERME biological macromolecules | CIRTA chem/biol of natural products | TRANSGENE genetic engineering | VALORGA continuous high-concentration methanization | BIOSYS diagnostic laboratory reagents | IMMUNOTECH hybridome | EUROZYME lactic ferments |
|---|---|---|---|---|---|---|---|
| Year created | 1979 | 1980 | 1981 | 1981 | 1981 | 1982 | 1982 |
| Initial employees | 1 | 8 | 14 | 4 | 12 | 7 | 45 |
| (upper management) | (1) | (3) | (4) | (3) | (6) | (5) | (4) |
| 1984 employees | 7 | 18 | 73 | 20 | 10 | 40 | N/A |
| (upper management) | (5) | (6) | (32) | (9) | (4) | (18) | |
| Capital in 1984 | | | | | | | |
| (1000 F) | 570 | 1050 | 80,000 | 3,650 | 3,500 | 10,000 | 20,000 |
| Outside finance | 1 | convertible | ** | 3* | 2 | 1 | *** |
| campaigns | | bonds* | | | | | |

* Starting capital entirely provided by organizers and their friends
** Paid regularly after a multi-year commitment
***Subsidiary of a large group plus convertible bonds

...And In The United States (Source APA)

| ACTIVITY | BIOASSAY SYSTEMS Cell culture | CREATIVE BIO-MOLEC. DNA tests | DIAGNON Monoclonal antibodies | INT'L BIOTECHNIQUES Molecular biology | LIPOSOME TECHNOLOGY Therapeutic additives | SYNTRO Viral Thera-peutics | PROTEIN DATABASE Data bank |
|---|---|---|---|---|---|---|---|
| Year created | 1977 | 1980 | 1981 | 1980 | 1981 | 1980 | 1981 |
| Initial employees | 10 | 4 | 3 | 5 | 15 | 10 | 3 |
| (incl.PhDs) | (4) | (2) | (1) | (2) | (5) | (5) | (2) |
| End '83 employees | 45 | 36 | 12 | 43 | 20 | 30 | 3 |
| (incl. PhDs) | (6) | (15) | (4) | (3) | (7) | (10) | (3) |
| Capital invested/ | | | | | | | |
| initial financing | 7.1 | 3.2 | 16.7 | 1 | 1 | 5 | 1 |

FOOTNOTES

1. See Biofuture, June 1983 and July 1983.

2. According to P. Lebas, "The Future of French Venture Capital Companies," Revue Francaise de Gestion, Jan-Feb/83.

3. "Creation and Management of Venture Capital in the French Context" (25-27 May 1983). AFINOVAC (Association pour le Financement de l'Innovation par le Capital-Risque), 148 boulevard Malherbes, 75017, Paris. Tel: (1)622.24.45.

4. See Table 3, page 19

5. The Agence Nationale pour la Creation d'Entreprises is particularly interested in "essaimage." ANCE, 142 rue du Bac, 75007 Paris. Tel: (1)544.38.25.

6. We should, however, mention the "essaimage" incentive policy orchestrated by Lesieur-Cotelle.

7. See the papers by L. Caignault and J. M. Ballester at the APRIA colloquium "Risk Capital and Biotechnological Innovation in Agribusiness."

12434
CSO: 3698/550

CIVIL AVIATION

## BELGIUM WILL PARTICIPATE IN AIRBUS A-320 PROGRAM

Brussels LE SOIR in French 14-15 Jul 84 p 8

[Article by P. B.]

[Text] The CMCES [Ministerial Committee for Economic and Social Coordination] gave the green light Thursday to participation by the Belgian aeronautics industry in the building of the small 150-passenger Airbus A-320, as regards both the airfoil, in connection with which SONACA will provide the prime contractorship for the leading edges of the wings (slats), and the power plant, in connection with which FN may take part in the development of version 4 of the Franco-American CFM-56. Our country has thus decided to play a major role in the launching of the new European plane, through Belairbus, in which the state's 32-percent ownership is represented by SNI, and in which, subject to forthcoming negotiations over the next several weeks, the remaining ownership is to be shared equally--34 percent each--by the regions on the one hand and industry on the other.

The CMCES's decisions involve an international program and must still be ratified by the Council of Ministers, which, as things stand at present, should pose no further problem. The most important thing is undoubtedly the fact that our country, which had already taken part in the A-310 venture, under which two planes were delivered to Sabena this spring, intends thus to preserve its position within the European consortium and even to enlarge it, considering its new contribution to the powering of the plane.

### Increased Share for FN

FN will receive a reimbursable advance of 695 million francs to enable it to finance its research and development work on the new version of the CFM-56 engine for the small Airbus. The Liege-based firm is not an unknown to the Franco-American consortium CFM International, which is the prime contractor for the CFM-56 that is to be used to retrofit the Super DC-8 and to power the new stretched Boeing 737. FN already has a share of around 2 percent in the fabrication of this engine; this share will be increased to around 5 percent pursuant to the funding the Government has just enacted.

The whole question revolves around the ultimate success of the future Airbus A-320, for which there is a large, hotly contested market. Moreover, the European medium-range jetliner will be offered to its clientele not only in the version powered by the CFM-56 engine. Some weeks ago, the European Consortium concluded an agreement with International Aero Engine that will enable it to offer its plane in an optional version powered by the new V-2500 engine, which is to be built jointly by the Americans, the British, the Germans and the Japanese. It is an engine that already looms as a formidable competitor of the most recent version of the CFM-56.

In accordance with the CMCES's decision, Belgium's participation in research and development outlays for the small Airbus will attain 1.1 billion francs. Nine-tenths of this reimbursable advance will go to SONACA, which will supply the prime contractorship for the Belgian participation in the building of the plane.

The remaining one-tenth will go to two firms installed in the Flemish region --ASCO (Zaventem) and Watteeuw (Bruges)--each of which will manufacture mechanisms for actuating the wing slats. One of these firms will produce the pinions and the other the racks; these components will then be assembled and delivered in operating condition to SONACA at Gosselies.

Of an estimated total of around 280,000 man-hours of work per year, it is expected that SONACA will retain some 65 percent; the other two partners will share the remaining 35 percent. Revenues, however, will be inversely shared: 52 percent of the estimated close to 1 billion francs of annual revenue will be going to the two Flemish firms, and 48 percent to SONACA. According to present projections, the first Airbus A-320 will be taking form on the Toulouse assembly line around the beginning of 1986, with a view to completing its maiden flight around the beginning of 1987 and being delivered to its first users around the beginning of 1988. Belairbus, with its 2-percent share of the A-320 program, will remain as the Belgian interlocutor within the European consortium, in which France's AEROSPATIALE holds 36.3 percent of the program, Germany's MBB 31.6 percent, British Aerospace 25.2 percent, and Spain's CASA 5.2 percent.

9238
CSO: 3698/571

## NEW TALK OF TA 11 AT AIRBUS INDUSTRIE

Paris LE MATIN in French 22 Aug 84 p 7

[Article by Jean Menateau]

[Text] A European long range plane capable of breaking the monopoly of the Boeing 707? The subject has been discussed for some time in aeronautics circles. But what is (relatively) new, is that the general contractor for this future project, in other words Airbus Industrie, has just lifted the veil that was concealing the TA 11.

It is a four-engine, long range, medium size plane, whose span will be 10,000-12,000 km, with a wider radius of action. The TA 11 could be offered in two versions, one for 230 passengers, and the other for 300. According to the Airbus disclosure letter, the plane could even be equipped with a larger version of the same jets that power the A-320.

Why this sudden resurrection of a possible European long range plane in the middle of the summer of 1984? It's very simple. The primary concern of Airbus, whose current essential interest is to assure the launching of the A-320, is to stake out the territory. "We have to say: we are here, including the long-range slot. Airbus will certainly not give up in advance on this future market." That is the statement of an aeronautics specialist close to Bernard Lathiere, president of Airbus.

Nearly three years later, this commentator is almost echoing the words of Francois Mitterand, who was celebrating his seven-year anniversary: "The Airbus line is to small to guarantee the lasting survival of the European industry as commercial airplane builders."

The TA 11 was therefore unquestionably placed on the back burner, due to the launching of the A-320. It is however resurfacing, as it did at the Hanover Show in May 1984. Lufthansa, notably, did not stop singing the praises of TA 11, joined by other companies, among which UTA. "But," they justifiably say in France, "big money is big money. The political circles are starting an operation, and we must not find ourselves short of money at the crucial time,

through a sort of effort dilution, when we are developing the A-320." "Out of the question," others add, "to 'make a stand' as Boeing did, when it wanted to launch the 757 and 567 at the same time. The Americans wanted to cover the market by force, and they really missed the target."

But how about some interest in the intermediate future? And what would be the Europeans' advantages be in "taking a position" as well?

A technical advantage: according to the latest Airbus studies, "the TA 11 can offer a passenger-km cost equivalent to that of the currently operating large four-engine jet plane (a clear allusion to the 747), despite the fact that the Airbus project is much smaller. This will allow two TA 11's to fly the Paris-Los Angeles route in parallel, for instance, at the same overall cost as that of the four-engine jet (quite obviously the Boeing 747)."

An economic advantage: everyone agrees that the companies' needs for this type of plane will begin to be felt at the end of the 1980's or the beginning of the 1990's. Unless Boeing reacts before that! But the media test probe launched by Airbus does indicate a certain intent. If Airbus, and therefore Europe, and therefore France, acquire the future long-range plane, the advantages, as well as the stakes, are clear: not only would the European lines have homogeneous and rational fleets, but they would also be free of the jurisdictional power of the Seattle company. Airbus for instance, could become a full-fledged airplane manufacturer. The choice of engine builder still remains to be made, when it will again be time to twist and turn, and to concede mutual advantages.

11,023
CSO: 3698/604

# COMPANY STRATEGY OF FRANCE'S BULL OUTLINED

## Wafer-Scale Venture a Loss

Paris LES ECHOS in French 23 Aug 84 p 6

[Text] It is meeting time at Bull in these waning days of August. Now that Trilogy has abandoned the development of a new integrated circuit technology, soon after having terminated its attempts at perfecting an IBM-compatible supercomputer, the French computer group is looking for a way to launch itself into the technologies of the future.

In 1980, when Gene Amdhal left his company to create Trilogy, Bull immediately decided to join the expedition. First of all in order to compete with IBM on its own grounds, but also and mostly, to take advantage several years ahead of the others, of the future development of entirely revolutionary so-called wafer-scale chips--which allow the fabrication of an integrated circuit on its silicon support--and thus assume a slice of the market for the new generations of computers.

Through the years, Bull invested $14 million to acquire a 7 percent share of the enterprise. Others, like DEC or Sperry, invested even more.

Bull lost its ante in the game. In June, an accounting reserve of 40 million francs was placed against the first half of 1984, and the management is currently calculating the exact amount of the losses.

What is more, Bull is very disappointed. When Jacques Stern and Francis Lorentz took the reins of the enterprise, they were quick to point out the asset represented for Bull by a technologic and financial union with such a dynamic company accross the sea, led by an inventor of genius. Now that Trilogy has dropped two of its projects and announced its return to conventional integrated circuit manufacturing, new plans will have to be formulated.

High Risk

"Our second track consists primarily of the internal fundamental research that we carry out on microprocessors for high power systems," Bull explains. It is true that three of the company's researchers have been working full time at Trilogy for a year, and that knowledge has been steadily exchanged. Moreover, they are not despairing of Gene Amdahl. Maybe this man who cannot stand still, will start out on a new adventure when he has earned a few cents with his conventional chips. Hope springs eternal.

"Everyone believed in Trilogy. We lost. Its withdrawal was a surprise even for the Silicon Valley hotshots. But we are a typical risk investment. And now, far from giving up, we are going to multiply our efforts," says Bull.

As if to defy the Americans and the French, MITI (Japan) announced yesterday the development of a component that uses a Josephson junction, a very fast electronic switch that consumes very little power when operating at low temperatures.

This is a system which could prove to be the component of the year 2000, should it ever reach an industrial phase.

## NEC Agreements

Paris LES ECHOS in French 23 Aug 84 p 6

[Text] Yesterday, the French group Bull indicated in Paris that following the protocol of principle of last March, it had just signed with the Japanese NEC commercial and technical cooperation agreements in the large-computer field (LES ECHOS of 28 March).

The agreements give Bull manufacturing and distribution rights for the very high power S-1.000 processors and its successors, made by NEC, one of the leading Japanese computer manufacturers. Starting in 1986, the S-1.000 will be integrated into Bull computers to complement with a top of the line product, the DPS-8 and DPS-88 computers already being sold by Bull.

NEC feels that this agreement "joins Bull's experience in systems and the efficiency of its sales network, with NEC's advanced technology."

In turn, Jacques Stern, Bull chief executive officer, points out that this association will make it possible to "offer high performance solutions to customers, in response to their higher power requirements."

11,023
CSO: 3698/605

## SURVEY OF INDUSTRIAL ROBOT POPULATION IN FRANCE, WORLD

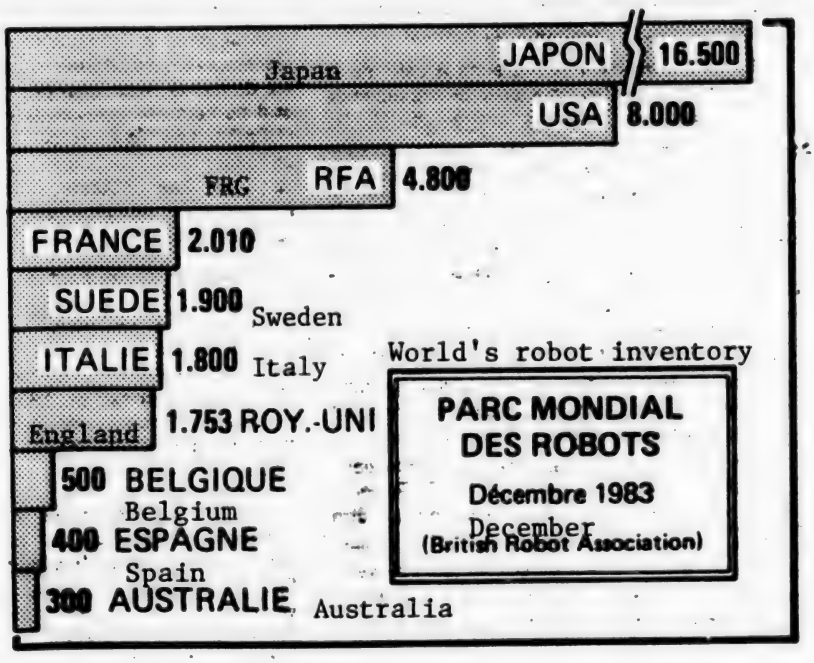
Paris LES ECHOS in French 20 Aug 84 p 9

[Text] The 1984 fiscal year promises to be of unequal quality for the major robot manufacturers working in France. For AKR (surface processing robots) the year should be explosive. After delivering 45 systems last year, bringing its installations to about 90 (two-thirds of them abroad), the company hopes to sell about 100 this year thanks to the introduction of 7-axis robots and analytical programming. Only one-third of the potential was achieved at the end of July, bringing the figure to 120 machines. The company remains confident, explaining that the bulk of the investments in its sector are determined at year's end.

Asea-France places its sales objectives in France at 105-120 for the year, slightly above 1983 (90 installed robots). About 60 machines have already been sold, bringing the figure for France to 265 units by the end of July (compared to 205 at the end of December 1983). Renault, which estimates that it will have installed 510 robots by the end of May (48 percent of them for its own use), against about 350 at the end of 1982 (75 percent of them for its own use), is not expecting great developments this year. The group wants to sell about 130-150 machines (an order of magnitude essentially similar to last year's), and instead, is placing its hopes on 1985.

According to AFRI (French Association for Industrial Robotics), at the end of December France had the fourth largest robot inventory in the world with 2010 units, and the second largest in Europe, after FRG. Earlier classifications placed our country in sixth and fourth positions respectively, behing FRG, Sweden, and England. AFRI estimates that the inventory has grown by 765 units in 1983 (310 of them from national manufacturers, including Asea, 155 from other Europeans, 110 from the Japanese, and 190 from the Americans).

But if we believe the estimates of our fellow publication AXES ROBOTIQUES, the French figure was only 1280 industrial robots and 515 non-industrial ones. The spread between the two estimates involves slightly divergent definitions of industrial robots. AXES ROBOTIQUES also declares that it based its




classification on orders placed and not on manufacturers' statements. According to its estimates, 80 percent of the robots are installed in enterprises of more than 1000 employees (70 percent of them in the automobile industry). PMI's (small and medium size enterprises) are therefore far from being involved in robotics.

300 French Robots in the World

The two surveys also point out that one-half of the robots installed in France are also produced here (48 percent according to AXES ROBOTIQUES, 1152 out of 2010 according to AFRI). But AXES ROBOTIQUES is worried that French robots are being studied for application in a large but outdated market: 83 percent of the nation's robots for spot welding, but only 7 percent for arc welding. And without Renault, only 14 percent of the French robots ....; not to mention that there are no more than 250-300 robots flying the French flag installed throughout the world. The battle will be a hard one.

11,023
CSO: 3698/606

## FINNISH COMPANY BEGINS PRODUCTION OF DOMESTIC IC'S

Helsinki HELSINGIN SANOMAT in Finnish 28 Aug 84 p 24

[Article by Heikki Arola]

[Text] Among the last of the industrial countries to do so, next year Finland will get its own semiconductor plant at Kilo in Espoo — 5 years late, the future plant's managers think.

A combine consisting of the MICRONAS [expansion unknown] Company, Nokia, Outokumpu, Kone, ASPO [expansion unknown] and the American Micro Powers Systems is building the plant, a combine whose product is integrated circuits, a basic appurtenance of today's information society needed in different types of electronic equipment.

MICRONAS has been selling its own products for a couple of years now. But so far only the planning of circuits has been done in Finland; the technical manufacture, the processing of chips, has been handled at the Micro Power Systems plant in California.

Finnish engineers have been looking for first-hand training in California and, when they get the plant in Kilo with its equipment, the test production run can begin as early as the end of next year. They believe they will go into production by 1986.

Miserable VALCO

Then why has construction of the plant been postponed for so long? "When we began to actively promote the venture, that miserable VALCO [expansion unknown] messed up the plans. A shadow was cast on the whole field of electronics," MICRONAS managers Olavi Autio and Pekka Jaakola recalled.

Then when they got started, they did not waste any more time; in 1978-79 SITRA [Finnish Independence 1967 Anniversary Fund] limited production feasibility studies. In 1979 Nokia, SALORA [Salo Radio] and ASPO decided to form a company, which they did the following year with other shareholders joining them. In 1982 its own planning center went into operation.

If they had gotten started earlier, overcoming the technology gap would have been easier. "It's like buying your first home. The later you start, the harder it is," Autio described it.

Like Bricks to a Builder

In various kinds of electronic devices integrated circuits are the same sort of basic components that bricks are to a builder.

There are two kinds of circuits. There are ordinary standardized basic circuits that work in any device and which any manufacturer can buy as one would nails in a hardware store — except right now when the Americans and the Japanese cannot produce basic models fast enough to meet the demand because of the huge run on videos.

Then there are special circuits, "tailored circuits," which are made to order for a specific customer and for a specific device. There are, for example, the MOBIRA [expansion unknown] Company's search device and automobile phone, for which MICRONAS has designed and built special circuits and on which their success on world markets is based.

Smaller Than Before

In trying to develop smaller electronic devices than before, manufacturers need special circuits instead of standard circuits. This trend in technical development makes it economically feasible to manufacture circuits in a country the size of Finland as well.

It does not pay for MICRONAS to try for the basic circuits market. In that case the only possibility would be for some big manufacturer to go ahead and make the same product more cheaply. When it makes a product designed by itself, it will at least not run into that danger very quickly.

Nevertheless, MICRONAS also has so-called semispecial circuits that are regularly sold. MICRONAS hopes to get to export these, possibly to "all those countries that are not on the U.S. Government's blacklist."

Most of Them from Elsewhere

Starting production in Finland does not therefore mean that the country will be self-sufficient thereafter. The gentlemen from MICRONAS estimate that the firm will meet about a third of the Finnish electronics industry's circuit needs. Two-thirds will still be imported from abroad.

Concentration on special circuits means that memory circuits and processors will be completely omitted from MICRONAS production. For example, Nokia will buy the processors it needs in its minicomputers from Intel.

Because they are specializing in a very limited sector, they will save enormously in terms of investments. They are now investing 60 million markkas in the Kilo plant; the sum required for more extensive production would very rapidly rise to 10 times that.

Because of expensive dollars, the cost of investments has steadily risen since equipment accounts for well over half the cost. Optical equipment will be procured from Japan, etching equipment from the United States and other products from Western Europe.

Contacts with Silicon Valley

The manufacture of microcircuits could not be realized in Finland without foreign partners. The techniques can only be learned by following the process on the spot.

The choice zeroed in on California following a search. Aside from being willing to cooperate, Micro Power Systems was suitably inclined in terms of production. It was also important for it to be an American firm that is small in size; the Finnish partner's voice would not have carried much weight in a bigger company. In addition they wanted to build contacts with silicon valley, where the industry's technological know-how is concentrated.

Nokia affirmed the partnership by purchasing 11 percent of Micro Power Systems stock. The legendary John Hall, one of the developers of the quartz crystal watch, owns about 20 percent of it.

However, the big Japanese firm of Seiko, which holds about 60 percent of Micro Power Systems stock, has the power of command in the California firm.

Japanese in the Background

However, Olavi Autio said that what is really at issue is the transfer of American technological know-how to Finland. The Japanese have merely been in the background.

When the cooperative venture began, the Finns were nothing but novices. In a couple of years time the situation has changed. The Americans are already applying to Finland for systems expertise. Last spring MICRONAS designed a two-circuit package ordered for Micro Power Systems.

When the Kilo plant goes into operation, the Americans will continue to participate in MICRONAS as before. The plan is for the two companies to go ahead and mutually manufacture each other's products on a licensed basis. Then the general principle in the industry that there should always be two places from which one can obtain the same product will be applied. Seiko is participating as well as a third wheel.

"As long as we have to depend on others, we don't dare transfer independently arrived at solutions to silicon. There is always the danger that a discovery may fall into the wrong hands.

"Systems know-how is already at a fairly high level in Finland. And there is reason to keep that know-how here too. So our own plant offers us the possibility of developing products that are more competitive than before."

When the plant is ready, MICRONAS' own sales volume will take a good swing upwards. This year's sales volume is 7 million; in 1986 it will be about 40 million. Taking inflation into account, it will come to 100 million in a few years time.

Externally, Kilo's future plant will remind one as little as possible of a conventional plant milieu; it will be more like a laboratory.

A stray hair is a catastrophe there and employees are expected not to smoke because, after an hour and a half's smoking, people give off oily flakes that interfere with the manufacturing process.

11,466
CSO: 3698/600

MICROELECTRONICS

SIEMENS INVESTS BIG IN 'MEGABIT' PROJECT

Frankfurt/Main FRANKFURTER ALLGEMEINE ZEITUNG in German 11 Jul 84 p 16

[Text] In the race for the best positions in microelectronics the German electrical giant plans to come onto the market with 1-megabit memories in 1987, (only?) 1 year behind the speedy Japanese. The next generation of 4-megabit memories will appear on the market in 1989-1900 at the earlier, in the estimate of Karlheinz Kaske, chairman of Siemens board of directors. Even 16-megabit memories will still be possible on the basis of conventional technology, so that Kaske sees it meeting needs for the rest of the century.

The so-called megabit project is at present the most obvious investment project at Siemens for the next few years. The micrometer technology necessary for the 1-megabit memory has DM 400 million set aside for it in planning, of which the intended manufacturing sit in Regensburg alone will require DM 300 million. An additional DM 100 million is being allocated for a pilot plant in Munich-Perlach. In the case of the so-called submicrometer technology for the 4-megabit memory, the construction of a development line in Munich-Perlach could probably absorb about DM 400 million, with several hundred million in addition for mass production at a still undetermined location. All in all, by the end of the decade at total investment of more than DM 1 billion is supposed to be sunk into the megabity project.

This is typical for Siemens investment policy having started on a new record journey. It is said to be leading to a new all-time high amount in the current business year (30 September) of DM 2.2 billion (last year 1.7) and in 1984-1985, including the first DM 200 million for the megabit project, it will scale a new peak with DM 2.7 billion. In addition, Siemens will increase its expenditures for research and development in the current year by at least DM 300 million, to more than DM 3.8 billion.

Siemens is cooperating with Philips in the process technology for 1- and 4-megabit memories. Both companies have approached their respective governments for financial support for submicrometer technology. Naturally it is not a question of liquidity for either of them, particularly not for Siemens, even if financial director Heribald Naerger says that the flood tide is close or has even passed. In the current year liquidity, which was recently quoted at more than DM 16 billion, has risen again in spite of massive diversions into operating funds (supplies, requisitions).

The great financial outlay by Siemens for investment and development has, of course, not only to do with the requirements for technical progress but also with the improved state of the economy. In Kaske's view, the economic thrust could still grow a little stronger, particularly in the areas which had not experienced much growth until now. The economic leader in the current year has been the component sector, which managed to show an increase in turnover of more than 20 percent in the last 8 months and is again in the black.

With a slightly improved net turnover profit for the entire company of 2 percent so far, the expected growth in turnover for 1983-1984 (30 September) of more than 10 percent, to about DM 45 billion, to a certain extent represents the bottom line of the calculable absolute improvement in returns. The force behind the positive development is mainly domestic business, which showed a rise in turnover in the 8 months of 1983-1984 of 17 percent. Relatively minor losses in income of DM 100 to 200 resulting from the metalworkers strike should be largely compensated for in 1983-1984. Incoming orders have climbed by 14 percent, excluding the statistical distortions of the generating station business. Together with a work load that has increased by 3 percent to about 80 percent, this has lead to the creation of 1,500 new jobs in the FRG. The component area has 700 of them and will probably require the same number in the need to hire about 2,000 scientists and engineers for the entire current year.

9581
CSO: 3698/581

MICROELECTRONICS

EEC FUNDS PROJECT TO DEVELOP OPTICAL CIRCUITS

Brussels LE SOIR in French 4-5 Aug 84 pp 1,6

[Article by Jacques Poncin: "Computer of the Future Will Undoubtedly Be Optical and Possibly...European!"]

[Excerpts] It is a secret to no one: When it comes to data processing, the Old Continent is certainly not at the top of the heap. This technology is and remains essentially American, and our share of it amounts to but a few crumbs. Things are due for a change, however, and it is in any case the intent of the European Commission to see to it that they do. Two recent initiatives of the EEC [European Economic Community] attest to this.

The first is defensive: As reported on page 19, the EEC has now succeeded in getting IBM to stop abusing its dominant market position in mainframe computers and to disclose in advance the specifications of its future machines.

The second is a more futuristic one: It will fund a joint effort among European scientists to develop an "all-optical" computer, which is to be the computer of day after tomorrow...

Nothing is ever sure when it comes to forecasting the future of technologies that are just emerging from Limbo. But insofar as it is possible to hazard a guess, one might say that the computer of the future--not the one of tomorrow but perhaps that of day after tomorrow--will no longer be electronic. And that one of the consequences of this could very well be that it will not be American or Japanese, but very simply European!

The fact is that our researchers are, at this point, very well equipped to compete in this field and that--for once!--they are cooperating on a European scale.

This is owing to an "operation" being carried out by the EEC, one of the coordinators of which is none other than Mr Paul Mandel, research scientist at the FNRS [National Scientific Research Fund], who is currently working at the ULB [Free University of Brussels] with the group headed by Prof Ilya Prigogine, Nobel Prize winner and leading advocate of the idea of scientific

effort on a European scale. Thus, this computer of the future would abandon electricity and electronics to "function" on the basis of light from a laser. This is why the (few) experts call it a "photonic" computer (the photon being the unit of light) or, more commonly, an all-optical computer. The subject warrants some clarification... The basic idea is a purely theoretical one, namely, that there could be, in optics, the same phenomenon that is found in other sectors of advance physics, and that is known as bistability. Bistability, Mr Mandel explains to us, is the property of certain systems of being able to assume two different states, although the parameters of the system remain identical.

The Key to a Door

But above all, the optical chip should revolutionize the basic design of the computer, the design of what is called its architecture. It would enable parallel processing, for example (the carrying out of many operations simultaneously), whereas, now, all machines operate on a sequential basis (one operation after another). There is every reason to believe also that the introduction of optics will revolutionize the very logic underlying the operation of electronic computers--in other words, that this new concept would open the royal door to what some are calling fifth-generation computers, or artificial intelligence. "We have a key that opens a door," comments Paul Mandel, "but we don't know what is behind that door." Why? Because no one has had the time yet to open it, owing to the fact that the idea is so terribly new.

This exciting "scientific stir" has not passed unperceived by the Common Market, which has decided to put money into optical bistability. A credit of 81 million Belgian francs has been opened to finance an international team of researchers, and two coordinators have been named: Mr Mandel, the theoretician, and Mr Smith, a practical-minded expert from Edinburgh. Eight institutions, comprising 11 teams in all, have been brought together (besides Brussels and Edinburgh, they include persons from Dublin, Milan, Florence, Pisa, Strasbourg, Frankfort, Munich, Berlin and Fribourg). On the basis of a symposium--held in Rochester (near New York), since optical stability was, at the time, being talked about only in the United States--the team has submitted a draft project to the EEC, in which it commits itself, to the EEC, to come up, within 2 years, with an actual logic circuit, hence the preliminary step to the all-optical computer of the future. What is involved is, to some extent, an "academic" demonstration of the feasibility of this computer of the future. There will still remain the problem of a similar demonstration at the technological level, taking into account, that is, the practical problems of constructing such a machine, and, above all, its cost.

9238
CSO: 3698/571

## NETHERLANDS REACTS TO COCOM POLICIES ON HIGH TECH EXPORTS

### No Conflict with U.S. Desired

Rotterdam NRC HANDELSBLAD in Dutch 10 Aug 84 p 10

[Article by Ben van der Velden: "Netherlands Wants No Conflict with United States on High Tech Exports"]

[Text] The Hague, 9 August -- The Dutch government does not want to disturb current relations with the United States with discussions about export constraints in trade with Eastern Europe. Dutch companies involved in this matter also prefer to consent to American demands rather than risk a conflict with American suppliers and buyers.

This was said in reaction to the West German announcement last week that Bonn, together with other countries of the European Community which experience that export constraint because of the United States approach, wants to take steps so that the American government will withdraw limiting restrictions.

Secretary of State Van Eekelen (European Affairs) feels that there is no need at all at this time for a conflict with the United States in the area of trade. He says that the relationship with America is too delicate for that. In his opinion, a European action would be interpreted as an attempt to influence the upcoming American election campaign.

Besides, the Netherlands has not yet received a single official request for common action from Bonn. In the Hague they point out that Dutch interests in trade with Eastern Europe are only limited. It involves about 3 percent of the total foreign trade of the Netherlands.

New List

Last month 14 NATO countries and Japan agreed within the COCOM organization on a new list of computer equipment which may not be exported to Eastern Europe, because, being high tech products, they could be used for military ends by the Soviet Union. Individuals involved in the negotiations concerning this list say that it involves a hard to achieve compromise "which was achieved without bloodshed."

Originally the United States apparently came up with "proposals which were too rough and not nuanced enough" for an embargo on exports of industrial products to the Soviet Union. It apparently often involved products which the Soviet Union can also manufacture itself. To prevent the export of those would only have led to "needless economic pain." In the end, the United States apparently took a step backward during the COCOM negotiations and under West European pressure accepted the stipulation that a precise description would be given of what computer equipment could and could not go to Eastern Europe.

There were repeated protests on the West European side against American attempts to exercise control also over American products which do not appear on the COCOM lists. It generally involves American parts which West European industries have used. The United States not only wants to prevent the Soviet Union from being able to use Western technology for military purposes, but also wants West European industries to respect American economic sanctions.

Because of that, in the Netherlands the Fokker airplane company missed a Libyan order last month for five F-28 aircraft. These aircraft are constructed with American parts, but it apparently does not involve equipment listed on any COCOM list of equipment which for military reasons is not suitable for exports.

According to Secretary of State Van Eekelen, it is not uncommon for those who supply parts to make demands with regard to the resale in a finished product. The Dutch government apparently tried without success to provide Fokker with the opportunity to secure the Libyan order anyhow.

Early this year, Fokker delivered three F-28 aircraft to Libya. The company refused to give in to American pressure not to sell those airplanes because the contract with Libya had been concluded a long time ago. Afterwards, Fokker was told by the American government that there would be serious problems if they were to arrange a follow-up order with Libya for another five F-28 airplanes.

After that Fokker gave up on that last Libyan order, but not only because the Dutch airplane industry needs the American parts. The company did not want to run the risk either of getting on a strained footing with one of the largest airplane markets, specifically the United States.

Never Complaints

Furthermore, according to experts involved in the many negotiations among the NATO countries and Japan, which cooperate within COCOM, there have never been any complaints in recent years about the quality of Dutch control on the embargo of sensitive technology for Eastern Europe. The Netherlands has repeatedly played a role in the cases of smuggling of such technology which have come to light.

Thus, since November of last year the justice department in Alkmaar has been investigating whether the dealer H.G.W. of Castricum may be subject to punishment after his attempt, together with Americans, to deliver equipment to Bulgaria, via Schiphol airport, without the required license. According to

the American Justice Department, the shipment which had already been seized in the United States involved high tech products which, in accordance with the COCOM agreements, cannot be shipped to Eastern Europe because the Soviet Union could use them for the development of military equipment.

The dealer however denies this. He says that it is not clear whether this equipment falls under the COCOM embargo. "If the Netherlands accepts everything the United States says, then you will be able to supply only French beans," is his position. He refused to comment any further, pending the outcome of the investigation.

Experts in this area cannot give any estimates about the amount of technology which reaches Eastern Europe via the Netherlands, in violation of existing agreements.

What is illegal, is unknown. However, they take the view that it is too little to help the Soviet Union much in the military area, however alarmed the American government may have been in recent years about the flow of technology to Eastern Europe. At the same time, they point out that possibilities for control are limited by the limited number of people who can be put into service and because normal commercial traffic cannot stand too many hindrances.

## Rumored West-West Transfer Restrictions

Rotterdam NRC HANDELSBLAD in Dutch 10 Aug 84 p 7

[Editorial: "Export of Technology"]

[Text] The revitalization of the United States is only a few years old. It was only 10 years ago that Nixon signed his three sentence letter of resignation. It was only 8 years ago that an unknown governor from Georgia went to Washington with Reinhold Niebuhr's theological thoughts in his knapsack: it is the sad duty of politicians to bring justice to a sinful world. It was only 4 years ago that the unfortunate preacher was driven from the temple.

All of this is still fresh in our memory and in the United States the political elite has not yet gotten over the seventies. Every time the worried question arises -- at the same time a sign of uncertainty: how could it happen? Followed by the firm resolution: never again.

Compared to the United States, the various European countries barely experienced any such rapid shifts. And that in itself is a reason why European (to the extent that they exist) and American views and perceptions can be so different.

How could it happen? That is a question which is still asked with concern in the United States when they survey the growth of the Soviet Union as a military superpower. Naivete, preoccupation with Vietnam, the pitfalls of detente -- those are the words with which the seventies are engraved in our memory. Never again is the slogan on which so many policy actions and adventurous sounding plans are based in Washington and which have repeatedly met with lack of understanding and with headshaking in European capitals.

The latest twist involves the transfer of high technologies. In American eyes it is a fact, and it is really unforgivable, that the Soviet armament has reached the same technical level as the United States by means of American technological knowledge. Consequently, since the end of the seventies American planning officials have been working on broadening their grip on the export of high technology.

After a long tug-of-war and following noisy interludes, such as that 2 years ago between America and Great Britain, the NATO countries plus Japan recently agreed on a detailed COCOM list of products which cannot be exported to the Eastern Bloc due to their military utility.

This COCOM compromise did not satisfy all the American wishes and the American Departments of Defense and Commerce are now threatening to sharpen the rules even more on their own. The new rule of secrecy has been applicable since 1982 and the number of patents bearing the "classified" stamp has increased substantially.

Furthermore, in a drawer in the Pentagon also lies the new export administration regulation No 379, behind whose sterile name hides a small time bomb: in it, the export of all sensitive technical data to Western countries, that is to say to allies, is subjected to a stringent licensing system.

For the last several weeks, a thorough study by an expert in this area, who is attached to the German embassy in Washington, has been circulating in Bonn. This report sounds the alarm against such new, unilateral plans by the United States. Heim argues in his report that technical-military cooperation between America and Western Europe, for example, becomes virtually impossible this way. Stimulated by this report and by complaints from German business and industry, the German minister of economic affairs, Martin Bangemann, also openly rang the bell this week. The German ITT subsidiary SEL [expansion unknown] went even a step further with the contract for electronic circuit systems for Hungary. France also looked for devious ways.

It is clear that more is involved here than a difference of opinion about technical knowledge. To begin with there is the question of whether generally speaking it makes sense to release such an avalanche of regulations which smother in the industrial legal departments all technological activities going beyond the borders.

Furthermore, there is the question of whether the Americans with their "never again" remained sober enough to put their own possibilities in perspective. As a matter of fact, industrial espionage is still an option open to the East European countries.

But aside from such footnotes it is primarily a question of how far one wants to go with the technical-economic gate locking with regard to the Eastern Bloc. Here lies the more basic difference in perception between a few European countries and Washington, a difference which does not date from today or yesterday, even if West German Minister Genscher this week did put his points of departure for detente (the new concept is "Verantwortungsgemeinschaft" [community of responsibility]) so demonstratively and exhaustively into words.

It is striking in all of this -- or if you like embarrassing -- to see how the Netherlands tries to find its way in the middle of this conflict. Speaking through Secretary of State Van Eekelen, the government has begged off in this matter. According to the Ministry of Foreign Affiars, Dutch interest in a more flexible export regulation is small because Dutch trade with Eastern Europe only involves 3 percent.

Anyone who takes this reasoning literally would wonder why the same ministry got so carried away then about the stationing of 48 cruise missiles, because their potential destructive power is less than 1 percent of all nuclear arms stationed in Europe. In terms of percentage it is also of no consequence.

The other statement from the Hague says that the Netherlands has no need for a new conflict with the United States after 3 years of flying back and forth. That reminds one at least of conceptional poverty. Those who know where they stand do not need to apologize, in other words do not need to conduct foreign policy in terms of guilt and shame.

8463
CSO: 3698/592

TECHNOLOGY TRANSFER

U.S. STANCE ON COCOM WORRIES FRANCE, FRG, NETHERLANDS

Netherlands Lacks Export Controls

Rotterdam NRC HANDELSBLAD in Dutch 16 Aug 84 pp 1, 9

/Article by Ben van der Velden: "Netherlands Does Not Check High-Tech Exports"/

/Text/ The Hague, 16 August--Dutch customs officials rarely check the contents of transit containers in Dutch ports. If goods are involved that are destined for the Soviet Union via our country, there are no controls for combatting the illegal transport of high-grade technology. American customs officials have increased the surveillance of exports to Eastern Europe over the past few years in order to counter the smuggling of technology.

A spokesman for the Ministry of Finance says that it is practically never the case that customs officials check into whether the contents of transit containers correspond to what is reported in accompanying documents.

Director A. Barendrecht of the Rotterdam firm Transworld Marine Agency, which is an agent for Soviet shipping companies, feels that Dutch customs officials are generally not interested in goods arriving from elsewhere which are destined for Eastern Europe via our country. He draws this conclusion at least from the fact that customs officials rarely inspect transit goods. According to him, sudden checks by the customs criminal investigation department occur with goods destined for Eastern Europe no more often than with containers destined for other parts of the world.

Dutch ports as well as Schiphol airport have been mentioned repeatedly in connection with illegal shipments of high-grade technology to the Soviet Union. Thus, according to the NEW YORK TIMES, French exporter, Jean Didat, said last year that he had been involved in smuggling equipment to the Soviet Union, and subsequently in temporarily bringing this same cargo back to the Amsterdam airport for secret repairs.

According to the spokesman from the Ministry of Finance, there is intervention in container transport, which is difficult to control, only if there are obvious clues. Last year this resulted in official reports of false declarations "which can be counted on the fingers of one hand." According to the spokesman, customs officials realize that stricter controls would result in unwanted delays. Container transporters discovered what this could be like last year during the office workers' strike.

The spokesman says that the way in which customs receives tips concerning the contents of containers in transit is a secret. According to sources in the Ministry of Foreign Affairs, these few clues come mostly from foreign special police. During the Falklands war, tips concerning illegal weapons transport from the British special police were for a time in abundance.

No studies have been made in the Netherlands on what the consequences of further American restrictions on the export of technology could be for industry in our country. Thus says a spokesman from the Ministry of Economic Affairs, which is aside from this remaining extremely silent about anything concerning this affair. In West Germany, the Ministry for Education and Science has had just such a study undertaken among a number of large industries.

This has resulted in a secret report, the contents of which were leaked to the West German economic newspaper HANDELSBALTT. /See following two articles./ It appeared that the consequences of stricter American embargos would be felt especially in space technology. In computer and microelectronics, the consequences would be "unpleasant," but the technology that the United States would not supply could eventually be gotten elsewhere. Military electronics and the development of new materials, areas in which the United States already has a big lead, would in part experience great difficulty.

West German Minister of Economic Affairs Bangemann has warned that his country will not accept new attempts by the United States to restrict the export of technology from the West to Eastern Europe. Dutch Undersecretary for European Affairs Van Eedelen has said that present relations with the United States should not be disturbed by discussions concerning export obstacles in trade with Eastern Europe. No complaints have been made on the part of the Americans about a lack of customs control for cargo in transit via the Netherlands.

France

As one of the Soviet Union's most important Western trade partners, France has up to now remained officially silent in this matter. But a recent article in the daily LE MONDE about French-American differences of opinion concerning restrictions on exports to Eastern Europe does appear to be based on data from an official of the French Ministry of Foreign Affairs who is involved in this matter. /See fourth article of this series./

These differences concern the list of articles that may not be exported to Eastern Europe according to an agrement by those countries belonging to Cocom, an organization of 14 NATO countries and Japan, for the control of exports to communist countries. During the talks about a new list which was prepared last month, France supposedly favored opening up the export of a product as soon as the technology became outdated, in opposition to the United States.

In the latest embargo list, a temporary embargo on electronic telephone exchanges was accepted up to 1988. Because France assumes that by that time present technology will be obsolete, there is no objection to the offer now being made by state-owned Alcatel-Thomson to supply just such a telephone exchange to Bulgaria after the expiration of that embargo.

The FINANCIAL TIMES wrote yesterday that American officials view this French position as not being in the spirit of the latest Cocom agreement. As early as 1979, reference was made in a report for the American Congress to the French tendency to take as independent a course as possible in trade with Eastern Europe. Mention was made of accusations that France is allegedly the country that violates the most Cocom agreements. On the part of the French, such accusations have been dismissed under earlier presidents as well as under the present socialist President Mitterand.

However, a spokesman for the French Ministry of Foreign Affairs does say that his country wants to maintain an independent policy with regard to the export of technology, the agreement reached within Cocom notwithstanding.

## Secret FRG Report Leaked

Duesseldorf HANDELSBLATT in German 3-4 Aug 84 p 1

[Article: "Bonn Complains About Barriers for Technology Transfer"]

> [Text] Bonn/Washington, 2 Aug 84--The Federal Government is concerned about the increasingly restrictive measures of the United States against the transfer of technology, which affect not only the USSR but also Japan and Western Europe.

Bonn has had the U.S. restrictions to the international transfer of technology and the consequences for the decisions of German enterprises on innovations investigated in a study. The previously secret study comes to the conclusion that one can expect changes in decisions on innovation if the U.S. restrictions are tightened further.

A new technological orientation, however, will likely bring about additional costs and would have to be adapted to new enterprise-strategic concepts, according to the Bonn investigation. Interesting in this connection is the fact that only a minority of German enterprises considers U.S. technology to be indispensable.

To counteract U.S. efforts more effectively, the study proposes joint action by the governments and economic circles in the framework of the EEC. In negotiations with the U.S. Government, at attempt should be made to "get the United States to mitigate its extraterritorial demands in the form of a weakening of the reexport clause."

Finally, the study makes mention of a "protection law." Through such a law, the Federal Government could forbid German companies to obey directives of foreign governments on the soil of the FRG. "From this one could expect a moderating influence on future U.S. decisions as well as an increase in the freedom of action of German enterprises," states the study.

The main instruments of U.S. controls on technology transfers are secrecy regulations, export restrictions and contractual clauses in public orders. According to the investigation, the legal status of the executor of the order

and the reexporter is not very secure. There was a lack of legal rights to authorization, protection against cancellation and compensation claims.

The U.S. Defense Department is named as the driving force behind the restrictive course. For the first time, according to the draft of a U.S. regulation, the transfer of critical technical data to Western countries is to be subject to approval.

The U.S. Senate, in turn, has relaxed the antitrust regulations to encourage technological progress within the United States. The senators decided unanimously that in the future large U.S. firms can carry on joint research and development projects even when they individually already control a substantial share of the market. The precondition is that their joint action be suitable to serve the public interest, to strengthen the competiveness of American industry, to create jobs and to lower prices through improved productivity. It is expected that President Reagan will sign the law immediately, for it is precisely in line with his philosophy.

There are, on the other hand, some ideological differences of opinion on various other bills before Congress. The Reagan Administration is as a matter of principle against direct subsidies to industry. For this reason, it has still scarcely touched the $285 million made available back under the Carter Administration in 1980. On the other hand, it favors tax relief and milder competitive regulations for private initiative in the research area.

## FRG Aerospace Technology Most Affected

Duesseldorf HANDELSBLATT in German 9 Aug 84 p 3

[Article: "Problems Especially in Aerospace Technology"]

> [Text] Bonn, 8 Aug 84--FRG enterprises feel the intensifying restrictions for technology transfer that are being pursued by the U.S. Government.

That was revealed by a survey that was prepared on the instructions of the Federal Government and that investigates the effects of the restrictions in the transfer of technology on the decisions of German companies for innovation (see HANDELSBLATT No 145, 3 August 1984).

The enterprises polled mainly denied having already been influenced in their decisions on innovations, but they did indicate that this will probably change if the "intensification trend" were to continue. The survey of German firms was concentrated in the areas of automatic handling and production technology, biotechnology, computer manufacture, semiconductor technology, aviation and space travel, new materials, optronics and telecommunications.

The firms queried were AEG-Kanis, AEG-Telefunken, BASF, Boehringer, Bosch, Brown Boverie & Cie., Hoechst, Krupp-Atlas Elektronik, Kuka, Laser Optronik, MBB, Messer Griesheim, MTU, Nixdorf, Dr. Rentschler, Schering, Siemens, Standard Electric Lorentz, Teldix, Telefunken and Wacker Chemitronic. The responses were given mainly by the higher company levels (department heads,members of the board of

directors). That is why the author of the study, with all due caution, belives that the conclusion is justified that the study is representative of the respective companies.

All of the companies except Wacker Chemietronic, the world's leading producer of the purest silicon (basic material for semiconductors), confirm the procurement of technology from the United States. The manner of procurement ranges from contracts of sale and licensing and cross-licensing agreements to joint ventures. Most of the enterprises were able to report difficulties in the transfer of technologies during the last 3 years. Exceptions were firms in the area of biotechnology, automated production technology and the new materials. The specified difficulties ranged from approval delays to the refusal to approve exports.

The most publicity was involved in the case of the suspension of the delivery of rotor components from General Electric for the production of turbines that AEG-Kanis was intending to deliver for the Western Europe-Soviet natural gas pipeline. Otherwise, the approval difficulties or refusals were mainly in military space technologies as well as millimeter-wave technologies (the link with radar developments) and in optronics and software. According to the study, difficulties have also manifested themselves in the fact that U.S. firms, pointing out the more restrictive attitude of the U.S. Government, have become more reserved in discussing possible technology transfers or have refused the transfer.

Two companies expressed concern mainly about the effects of the VHSIC-Program being promoted by the U.S. Defense Department and about the fact that European efforts to participate in it appear to have failed. The components developed in the framework of the program, which, among other things, would have a central function in future weapons systems, would not be cleared by the United States.

An aerospace enterprise reported on an incident that, in the opinion of the authors, verifies the uncertainty about the future control of space technology. The European Space Agency ESA and NASA in the United States, with a view to a possible joint space station, had agreed that the space consortia should each prepare a "preliminary space-station analysis," which they would then exchange. "Although expressly the requirements set by the other side for the use of the station were also to be considered in the study, the U.S. firms refused to make these data known, pointing out the required export approval," states the investigation.

Vagueness About the Reexport Clause

Only a few of the enterprises polled have so far felt appreciably restricted in their freedom of action by the contractual reexport clause. In this connection, the investigation points out the uncertainty of companies that sometimes think that they must apply for reexport approval only for exports to Eastern Bloc countries.

The firms participating in the Airbus project, however, expressly confirm the drastic effect of the approval obligation. Thus, for example, the U.S. Government prohibited the reexport of the General Electric turbines that were built

into aircraft intended for Libya. The consideration of the Airbus consortium to achieve a European solution without U.S. technology was substantially influenced by the experience in the case of Libya, the study stresses.

Whether or not a substantial tightening of restrictions in the transfer of technology will lead to problems for German enterprises will largely depend upon the degree of dependence of the firms, the study forecasts. The companies polled in the area of computers and microelectronics expect a serious impact only in the event of an immidiate and drastic tightening of the restrictions. Otherwise, the consequences are rated as "unpleasant." The missing technologies could be replaced from other sources.

In contrast, the companies in areas in which the United States has a substantial lead were reckoning with noticeable effects even in the case of a less severe tightening of the regulations. This is true especially for certain areas in military electronics, computer aided design (CAD), optronics and new materials.

## France Disagrees with U.S.

Paris LE MONDE in French 9 Aug 84 p 22

[Text] The Swedish Ericsson Group recently decided not to bid in Bulgaria's invitation to tender for the equipment of it electronic telephone centrals. British leading firms did the same 2 weeks ago.

There withdrawals by Western companies fall within the decisions adopted at the beginning of July by the Coordination Committee for Multilateral Control of Exports to East Bloc Countries (COCOM). The Bulgarian contract was a trial balloon. The main question was to know whether the United States would succeed, as they were committed to do, in seeing that the decisions adopted by the COCOM were respected by Western countries, such as Sweden, which are not members of that committee (1). If they failed, there could be "leaks" of strategic products and the COCOM stance would be nothing but an empty gesture since a boycott is only effective if there is a united stand.

Does the Bulgarian case prove that after much controversy the West has unanimously agreed on its position and will abide by it? One can think so. Up to now in Europe, business considerations had prevailed over the "strategic" considerations so important to the Americans. Many countries questioned the effectiveness of a technology boycott against the USSR. But there seems to have been a shift of positions.

France has undoubtedly played an important role in this development. Paris, which had been very reluctant in the past, came to the COCOM negotiations this year with a new philosophy of "becoming a team player." During the meetings the lists of commodities under export ban, which had been drawn in 1982, had to be adjusted on the basis of advances in technology. The United States, that is to say the Pentagon, which directs Washington's policy in that sphere, wanted

1. COCOM members are all the Atlantic Alliance countries (except for Iceland) and Japan.

these lists to be expanded to include new items in the field of data processing, telecommunications and robotics. France could have blocked these negotiations since any new list must be adopted unanimously but that country chose to "play ball" maintaining that the "adjustment" to the technologies must be a two-way street. "New products should have been banned but, at the same time, lift the ban on items of outdated technology," is what they said at the Quai d'Orsay [French Foreign Ministry].

For several weeks Americans and French argued over that issue. In the view of the United States the embargo should be maintained for any technology until the USSR succeeded in developing it. France was in favor of "controlling the lag of East bloc countries" by agreeing to lift the embargo on a product as soon as its technology becomes outdated. France, for instance, wanted to lift the embargo on 8-bit micro-computers (which can be bought in any store) but maintain the embargo on 16 and 32-bit microcomputers.

Resignations

According to the Quai d'Orsay the Europeans came to accept, somewhat reluctantly, the French theory and the Americans gave in. Perhaps they did it because, a few months before the elections, Mr Reagan wanted to avoid a failure in the negotiations which could give rise to renewed criticism of the hawks in his administration who have been accused of showing tactless intransigence towards the allies. The fact that some U.S. officials resigned from the COCOM indicates that in the United States there is deep debate over this issue.

Finally France agreed to include new items in the lists: some advanced robots, basis softwear and satellite launchers. On the other hand the embargo was lifted for some numerically controlled machine tools, computers (for instance only 2 of the 15 machines produced by Bull could be exported in the past while now 9 of them can) and 8-bit microcomputers. On the matter of ground based electronic telephone centrals, "which were all under embargo," the Quai d'Orsay points out that the embargo will be lifted "in 1988 for equipment now in use" (that is to say for current technology). That is why France, which has offered its current MT-20 centrals to Bulgaria, is not withdrawing that offer. Therefore in the view of the Quai d'Orsay the compromise reached at the beginning of July represents a "relative softening" of the rules set by COCOM.

All the same this has brought new recognition to this agency which a few years ago had fallen into temporary inactivity and whose decisions were often disregarded by the European countries, mostly by France. Such development cannot displease the United States. Some people are certain to see this as a new sign of the "Atlantization" of French diplomacy.

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## ERICSSON FEARS COCOM RULES WILL PRECLUDE EAST BLOC SALES

Stockholm SVENSKA DAGBLADET in Swedish 3 Aug 84 p 33

[Article by Johan Selander]

[Text] Telephone manufacturer L. M. Ericsson may be forced to withdraw its offer to sell AXE digital telephone exchanges to Bulgaria.

"We probably will be unable to deliver any telephone exchanges with the new digital technology to Eastern Europe," director Magnus Lemmel of Ericsson told SVENSKA DAGBLADET.

The sale may be prevented by American regulations concerning export licenses for advanced American technology.

Magnus Lemmel would not say whether Ericsson would withdraw its bid or simply let it expire, but it is clear that the prospects of this major deal with Bulgaria have shrunk since the Western coordinating committee for export control (COCOM) in Paris recently added telephone exchanges with stored program control (SPC), i.e. computer-controlled exchanges, to its embargo list vis-a-vis the Eastern countries.

### Swedish Technology

The SPC exchanges include not only the AXE, but also Ericsson's AKE 13, ARE 11, ARE 13, and exchanges such as the British System X.

Sweden does not belong to COCOM and, in addition, the "intelligent" aspects of AXE, i.e. the systems engineering, are Swedish. Only the components are American.

"To be sure, Sweden does not belong to COCOM, but we are dependent on them," said Kjell Sandberg of Ericsson's marketing staff. "If we go against COCOM, the Americans could respond by refusing to deliver engines for our JAS aircraft, for example."

In addition, Ericsson is now preparing to sell the AXE system on the recently deregulated American market--and on an extremely large scale. Within 7 or 8 years, the company hopes to have a 10-percent share of the American market. This makes the situation extremely sensitive.

Ericsson's competitors for the Bulgarian order include the British companies GEC and Plessey, with their System X. For a long time, they opposed adding SPC exchanges to the embargo list. In the long run, however, their dependence on American technology made it impossible for them to resist the American demands. As a result, the System X bid will be withdrawn, according to the FINANCIAL TIMES.

But the British have made one reservation: if Ericsson continues to work seriously toward selling the AXE system to Bulgaria, GEC and Plessey could request a dispensation from the COCOM regulations, in order to let the System X bid stand.

At present, no Warsaw Pact country has an AXE system. The system has been installed in China and Yugoslavia, however, which are given generous treatment when it comes to export licenses from the United States.

Ericsson has exported an AKE 13 system to Czechoslovakia and an AXB system to Moscow. The latter was installed for the Moscow Olympics of 1980. Both these systems are formally SPC systems and the AXB system in Moscow has the same control system as the AXE. It is unclear whether Ericsson can deliver spare parts for these systems in the future.

AXE Sold To 54 Countries

The AXE system was installed for the first time in 1978. Since then, it has been sold to telecommunications services in 54 countries. It is one of the greatest Swedish industrial success stories ever. Ericsson's main competitors in the field of digital telephone exchanges are AT&T, ITT, and Siemens.

This year AT&T lost part of its extremely large share of the American market as a result of deregulation. The company was divided into seven new telephone companies, each of which will handle its own purchasing. This opens up the United States market for Ericsson, which has already opened a technological center in Dallas, Texas, to adapt the AXE system to American conditions.

Ericsson has been competing with Siemens for 4 years for an anticipated major order from Greece. Greece is a traditional Siemens market and leaders at Ericsson believe that Siemens is responsible for the delays in the Greek order. Supposedly, a decision was reached last week, but so far there has been no word from Athens.

Uruguay is also an old Siemens market. But Ericsson has successfully negotiated contracts in Uruguay this year, which Ericsson views as a feather in its cap.

Ericsson has been negotiating a major order in Algeria for 3 years. This is a traditional Ericsson market and it is believed that the order has been delayed by rapid developments in technology. New bids have been solicited as the technology has been refined. Financing questions have also caused problems.

In Turkey, the race seems to be over. There, ITT finally came home the winner after tough competition with both Siemens and Ericsson. To be sure, Ericsson

has not yet received any official word from Turkey, but "We see Turkey as a closed book," Kjell Sandberg told SVENSKA DAGBLADET.

The AXE system has now been installed in the following countries: the Antilles, Argentina, Australia, Bahrain, Brazil, Cayman Islands, Chile, Colombia, Costa Rica, Cyprus, Denmark, Egypt, Ecuador, El Salvador, Fiji, France, the United Arab Emirates, Hong Kong, Ireland, Iceland, Italy, Jamaica, Yugoslavia, Kenya, China, Korea (South), Kuwait, Lesotho, Lebanon, Macao, Malawi, Malaysia, Morocco, Mexico, the Netherlands, Norway, Oman, Pakistan, Panama, Saudi Arabia, Seychelles, Spain, Great Britain, Sweden, Switzerland, Thailand, Trinidad and Tobago, Tunisia, Uruguay, the United States, Venezuela, Zambia, and Zimbabwe.

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## DECREASE IN SWEDISH EXPORTS TO SOVIETS NOTED, DISCUSSED

Stockholm DAGENS NYHETER in Swedish 27 Aug 84 p 6

[Article by Bengt Lindstrom and Ingemar Lofgren]

[Text] The embargo policy of the United States has reduced Swedish exports to the Soviet Union. But the Soviet Union is a market of the future and it would be wise for Swedish companies to remain there. It may be difficult to regain lost shares of the market in the future.

This was stated by Gunnar Thuresson, technical attache in Moscow.

"Our impression is that the United States pays more attention to what non-American companies sell to the East than what American-owned companies sell to the East," Thuresson said in a TT (TIDNINGARNAS TELEGRAMBYRA) interview.

"The Soviet Union wants to purchase entire technological systems and turn-key plants. If the manufacturer cannot deliver everything, then there is no deal. This is difficult if the system from Sweden contains parts purchased from the United States."

"Perhaps Swedish companies must choose between trading with the United States and with the Soviet Union, but obviously if Sweden does not sell to the Soviet Union, some other country will."

Export Decline

Gunnar Thuresson believes that exports and imports between Sweden and the Soviet Union have gone awry.

Last year Swedish imports from the Soviet Union totaled almost 8 billion kronor,... while Sweden sold goods to the Soviet Union for only 2 billion kronor.

In addition to the American embargo, the decline in Swedish exports is due to high interest rates and credit restrictions in Sweden. The Soviet Union wants to purchase most major industrial products on credit, but does not want to pay more than 7.6 percent interest.

As long as interest rates in Sweden are higher, it will be difficult to compete

with the other Western countries.

The Soviet Union suffers from a shortage of Western currency. What it has, it invests primarily in foodstuffs. Several years of disappointing crops have forced the country to import wheat and other foods. They are also investing large sums to improve agricultural machinery and silo facilities.

In the area of industry, the Soviet Union is forced to invest in repairs and renovations instead of new purchases. High technology is the exception. Now the United States has toughened its embargo in this field.

"The American policy of reducing trade in high technology with the Soviet Union has slowed overall industrial development, but hardly military expansion," said Gunnar Thuresson.

Section head Carl-Johan Aberg of the Foreign Ministry's trade section refused to comment on Gunnar Thuresson's statements.

"Only the companies themselves can determine the effect of the American embargo," he told DAGENS NYHETER.

The Ericsson Concern, which is one of the largest Swedish exporters to the Eastern countries, does not share Thuresson's opinions.

"First of all, I do not believe it is easier for American companies than for Swedish companies to export to the Soviet Union. We are monitoring the situation closely and there is no evidence of discrimination. If we discover any such evidence, we will make it known immediately," director Magnus Lemmel told DAGENS NYHETER.

"Of course, the embargo means limitations on high technology exports, but there is no difference between our ability to export and that of England or West Germany, for example."

Executive vice president Arne Bennborn of Asea said:

"Of course, the embargo has placed limitations on trade, but it is not the primary cause of reduced trade between the Soviet Union and Sweden. The embargo is only one factor among many."

Sharp Drop

"Trade with the Eastern countries has always fluctuated and it is difficult to draw any clear conclusions. Now there has been a sharp drop in trade. The Soviet Union is having problems obtaining foreign currency, but that is precisely the same problem certain Latin American countries are facing right now."

Alfa-Laval has noticed no change in its trade with the Soviet Union.

"The embargo has not affected Alfa-Laval in any way. We had a very good year

last year and there are no indications that the situation will change this year," said Harry Faulkner, executive vice president of Alfa-Laval.

"The embargo may cause problems for some companies and the Americans have become stricter recently, but I would not agree with Thuresson in his conclusion that the embargo has reduced Swedish exports. At least this is not true in the case of Alfa-Laval."

In the TT interview, Gunnar Thuresson also stated that the frosty political climate between the Soviet Union and Sweden also had effected trade.

This was denied some time ago in an interview conducted by the journal AFFARSVARLDEN with several representatives of the Soviet Ministry of Foreign Trade.

Data Analysis

"The reasons are strictly commercial. We reached this conclusion by analyzing the statistical data. The political speculation is nothing but newspaper scribbling. We believe that the credit problem is the main reason," they said.

According to the interview, the Soviet Union places priority on the following sectors of trade with Sweden: paper and pulp, the wood industry, food, meat, and milk production, agricultural products, and oil and energy products.

Thus, according to the trade representatives, the credit restrictions were to blame. But another factor also played an important role: Sweden's reluctance to purchase Soviet natural gas.

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